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(54) **REGISTER FOR COUNTING AND TRACKING ITEMS IN A BAG**

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G06K 19/077 (2006.01)
G08B 13/14 (2006.01)
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G06Q 10/08 (2012.01)

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CPC **G06K 7/10366** (2013.01); **G06K 7/10** (2013.01); **G06K 19/07758** (2013.01); **G06Q 10/087** (2013.01); **G06Q 10/08** (2013.01); **G06Q 50/28** (2013.01); **G08B 13/1427** (2013.01)

(58) **Field of Classification Search**

CPC G06K 19/07758; G06K 7/10; G06K 7/10366; G06Q 10/08; G06Q 10/087; G06Q 50/28; G08B 13/1427
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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,299,116 A 3/1994 Owens et al.
5,818,336 A 10/1998 Varga et al.
(Continued)

FOREIGN PATENT DOCUMENTS

CA 2343775 A1 3/2000
CN 103268504 A 8/2013
(Continued)

OTHER PUBLICATIONS

Written Opinion of the International Searching Authority mailed Feb. 24, 2016, for International Patent Application No. PCT/US2015/052678, 26 pages.

(Continued)

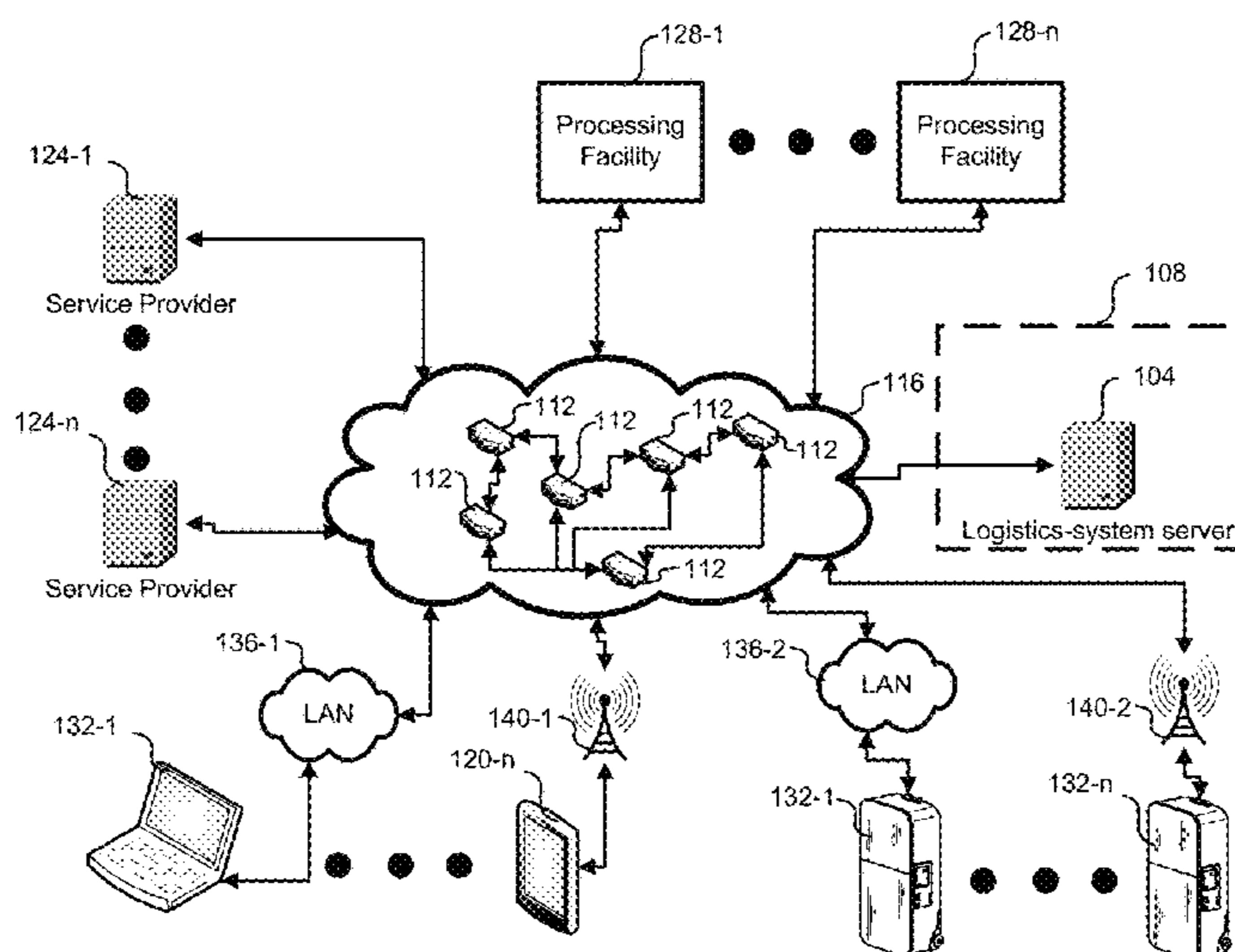
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(57) **ABSTRACT**

A register for counting and tracking items in a bag comprises a manifest and an RFID reader. The RFID reader is used to query a plurality of RFID tags attached to items contained in the bag. The register creates reports counting and/or identifying changes to items contained in the bag while the bag is routed and/or items in the bag are processed for a customer.

20 Claims, 22 Drawing Sheets



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2013/0218589	A1	8/2013	Lerner	
2013/0221898	A1	8/2013	Frost	
2013/0346255	A1	12/2013	Hayden et al.	
2014/0009291	A1	1/2014	Requist et al.	
2014/0057646	A1	2/2014	Vaananen	
2014/0062700	A1	3/2014	Heine et al.	
2014/0157526	A1	6/2014	Larmo et al.	
2015/0106261	A1*	4/2015	Shmulevsky	G07F 17/12 705/40

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,010,239	A	1/2000	Hardgrave et al.	
6,433,732	B1	8/2002	Dutta et al.	
7,183,919	B2	2/2007	Wang	
7,281,615	B2	10/2007	Siwak et al.	
7,378,604	B2	5/2008	Truong	
7,394,165	B2	7/2008	Schiller	
7,511,617	B2	3/2009	Burman et al.	
7,757,947	B2	7/2010	Reznik et al.	
8,077,041	B2	12/2011	Stern et al.	
8,164,452	B2	4/2012	Moses et al.	
8,358,199	B2	1/2013	Nesling	
8,485,329	B1	7/2013	Roy et al.	
8,624,934	B2	1/2014	Paushkina et al.	
9,154,486	B1*	10/2015	Saylor	E05B 65/52
2005/0099309	A1	5/2005	Hum et al.	
2006/0087432	A1	4/2006	Corbett, Jr.	
2006/0207850	A1	9/2006	Lewis	
2007/0229272	A1	10/2007	Cash et al.	
2008/0201244	A1*	8/2008	Johnson	G06Q 10/087 705/28
2008/0204233	A1	8/2008	Agrawal et al.	
2009/0091453	A1	4/2009	Ishida et al.	
2009/0115572	A1*	5/2009	Valbh	G06Q 10/00 340/7.58
2009/0265248	A1*	10/2009	Walker	G06Q 10/08 705/17
2009/0322486	A1	12/2009	Gerstel	
2010/0174759	A1	7/2010	Piccinini et al.	
2010/0211418	A1	8/2010	Mateer	
2011/0040655	A1	2/2011	Hendrickson	
2011/0040757	A1	2/2011	Kossi et al.	
2012/0098642	A1*	4/2012	Krawczewicz ..	G06K 19/07707 340/10.1
2013/0043080	A1	2/2013	Kritzler	
2013/0050019	A1*	2/2013	Mahmoud	G06Q 10/08 342/357.25

FOREIGN PATENT DOCUMENTS

EP	1110138	B1	5/2003
KR	10-2013-0109563	A	10/2013
WO	00/16189	A1	3/2000

OTHER PUBLICATIONS

Notice of Publication of Application dated Mar. 31, 2016, for U.S. Appl. No. 14/634,369.

Author Unknown "Lugless Luggage Shipping" *Lugless*. Web. Apr. 2015, all pages. <<http://www.lugless.com/>>.

Author Unknown "Your Closet in the Cloud" *Make Space*. Web. Apr. 2015, all pages. <<https://www.makespace.com/>>.

Lumb, D. "MakeSpace: When Venture Capitalists Go Startup" *Fast Company*. Web. Mar. 2014, all pages. <<http://www.fastcolabs.com/3027695/makespace-when-venture-capitalists-go-startup>>.

Menton, J. "Your Closet in the Cloud: Will MakeSpace Be the Amazon of Physical Storage?" *International Business Times*. Web. May 2014. Retrieved Mar. 2015, all pages. <<http://www.ibtimes.com/your-closet-cloud-will-makespace-be-amazon-physical-storage-video-1590735>>.

Wikipedia "Luggage Free" *Luggage Forward, Inc.* Web. Mar. 2015, all pages. <http://en.wikipedia.org/wiki/Luggage_Free>.

Wikipedia "Luggage Forward" *Luggage Forward, Inc.* Web. Mar. 2015, all pages. <http://en.wikipedia.org/wiki/Luggage_Forward>.

U.S. Non-Final Office Action mailed on Mar. 24, 2015 for U.S. Appl. No. 14/583,006, filed Dec. 24, 2014, all pages.

Non-Final Office Action Mailed Jul. 5, 2016, for U.S. Appl. No. 14/634,369, 6 pages.

International Preliminary Report on Patentability of PCT/US2015/052678 mailed Apr. 6, 2017, all pages.

* cited by examiner

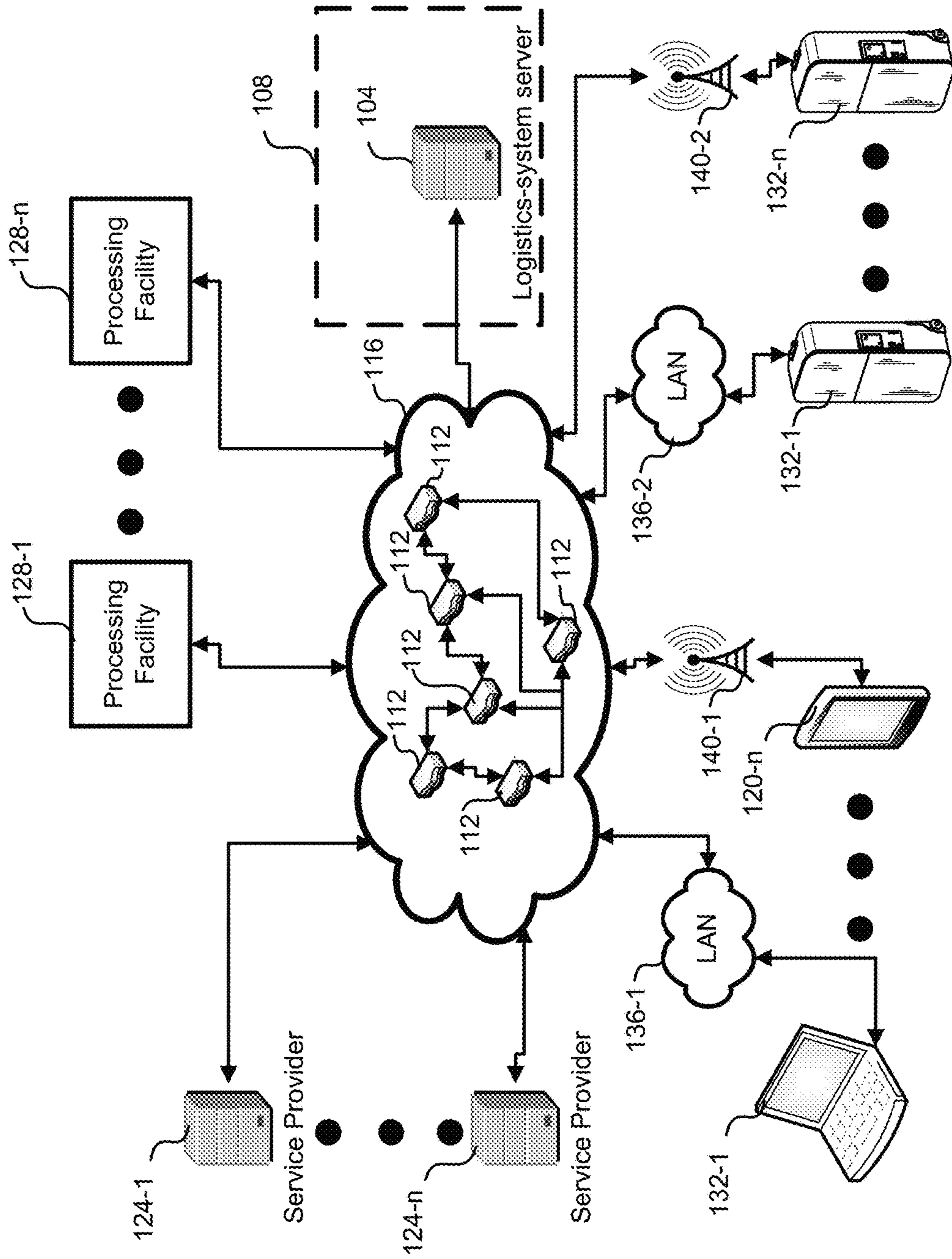


FIG. 1A

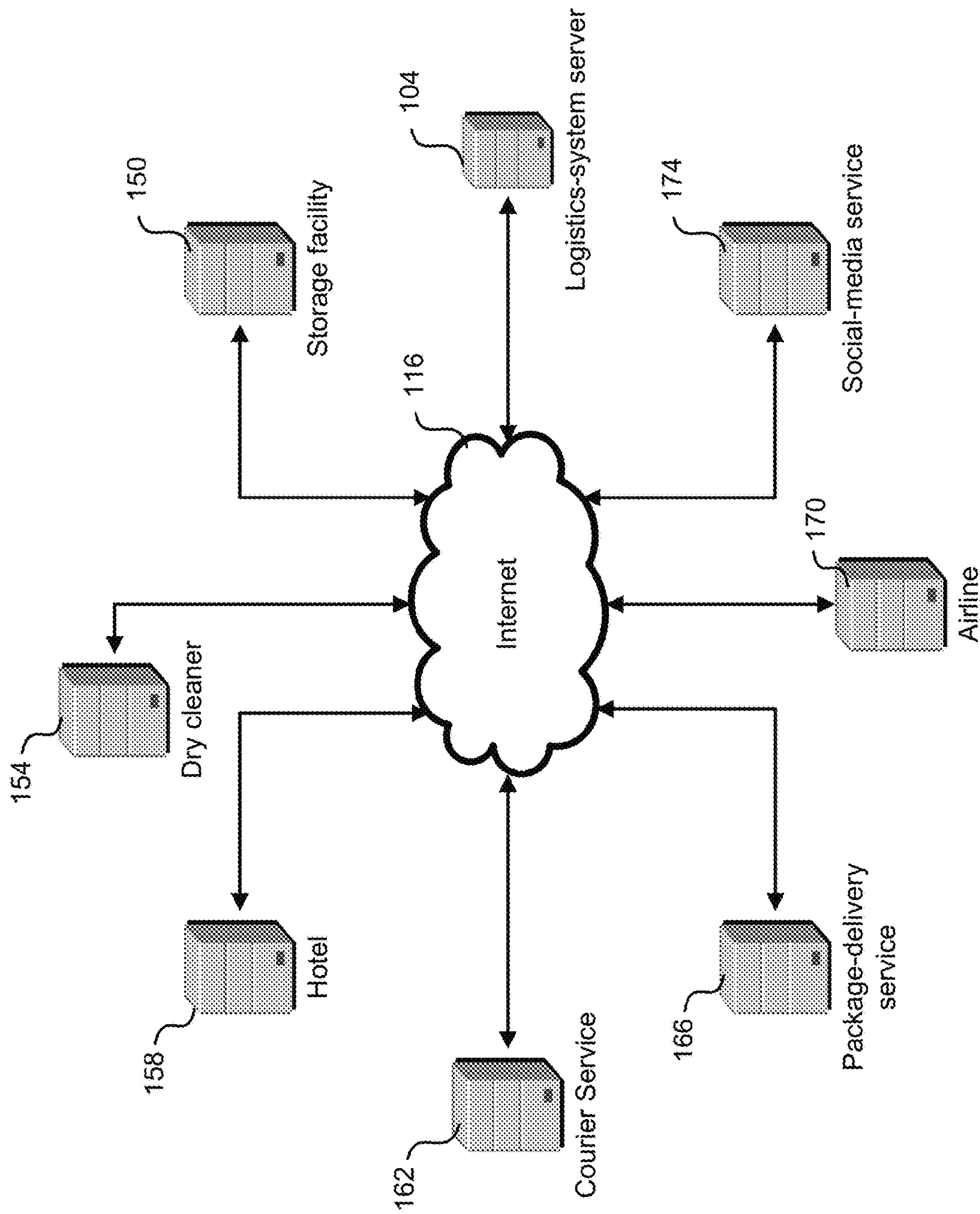


FIG. 1B

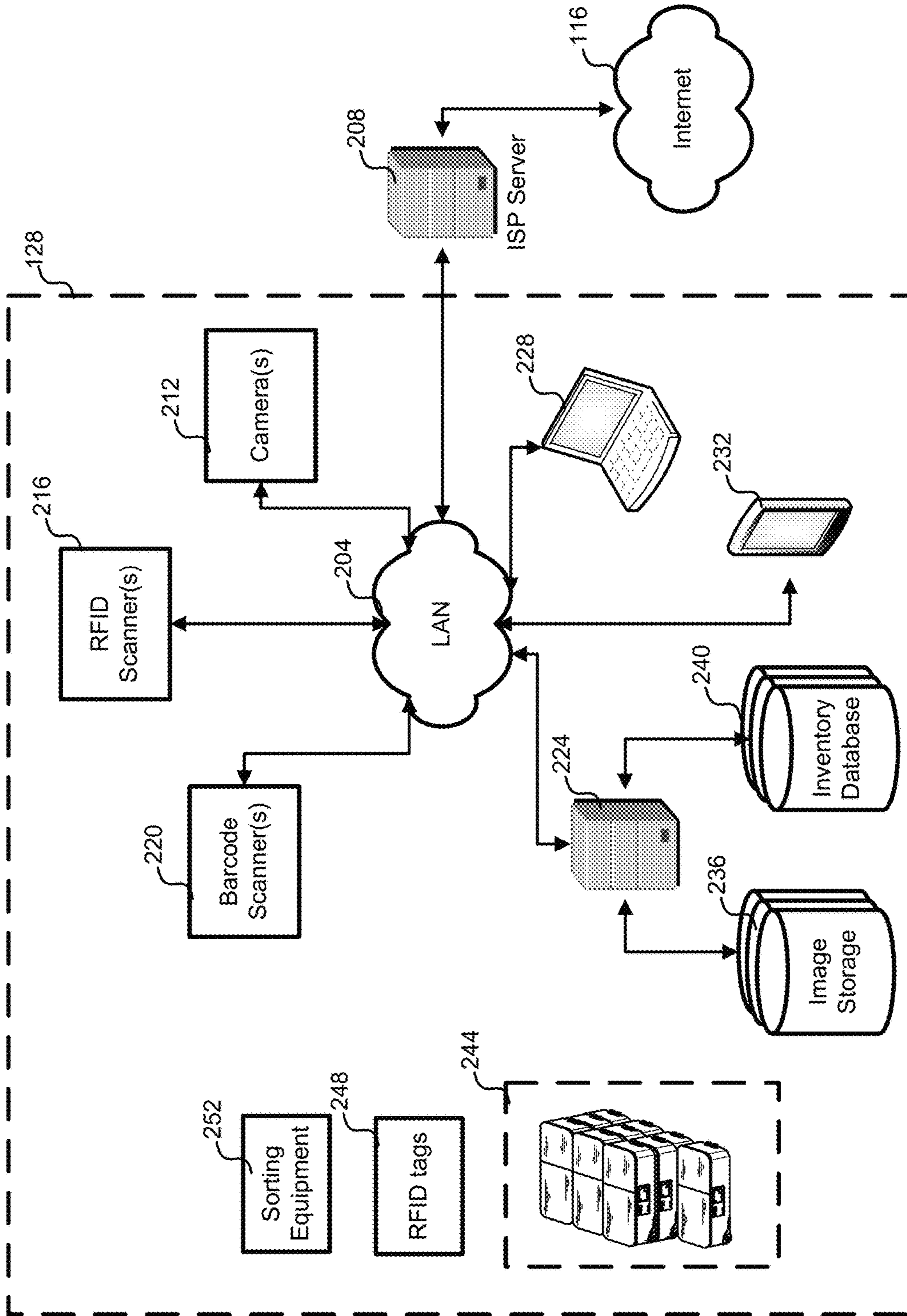


FIG. 2

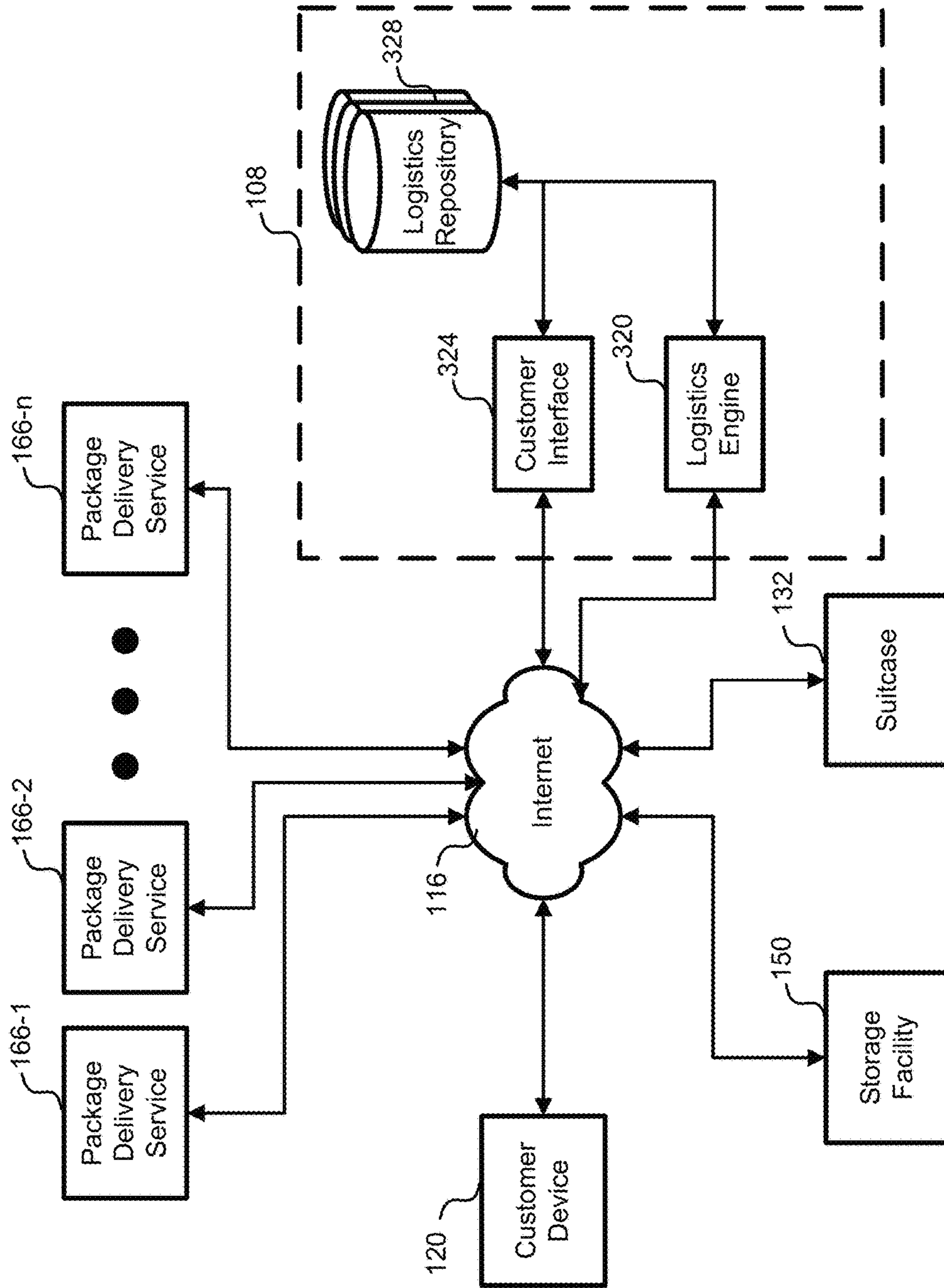


FIG. 3A

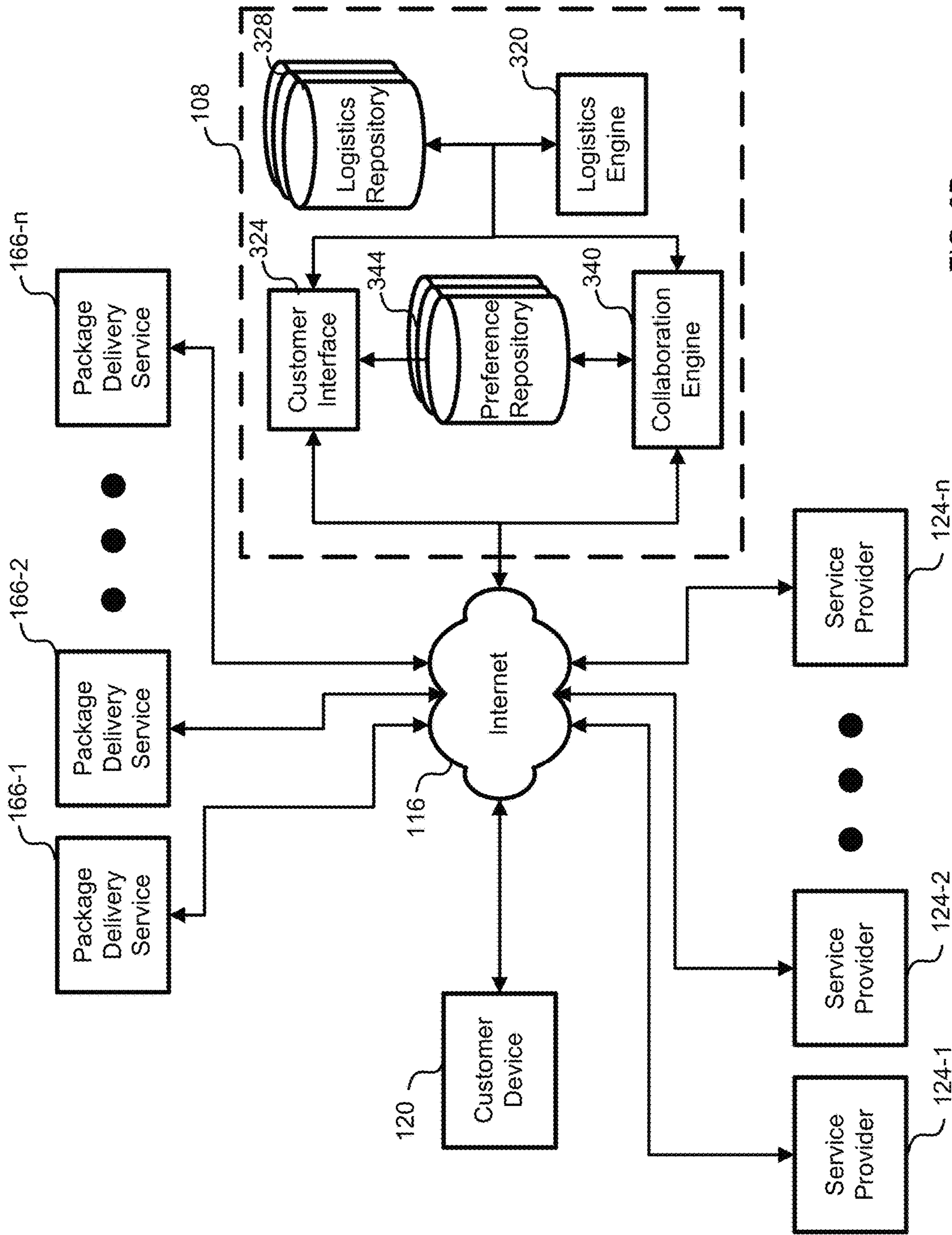


FIG. 3B

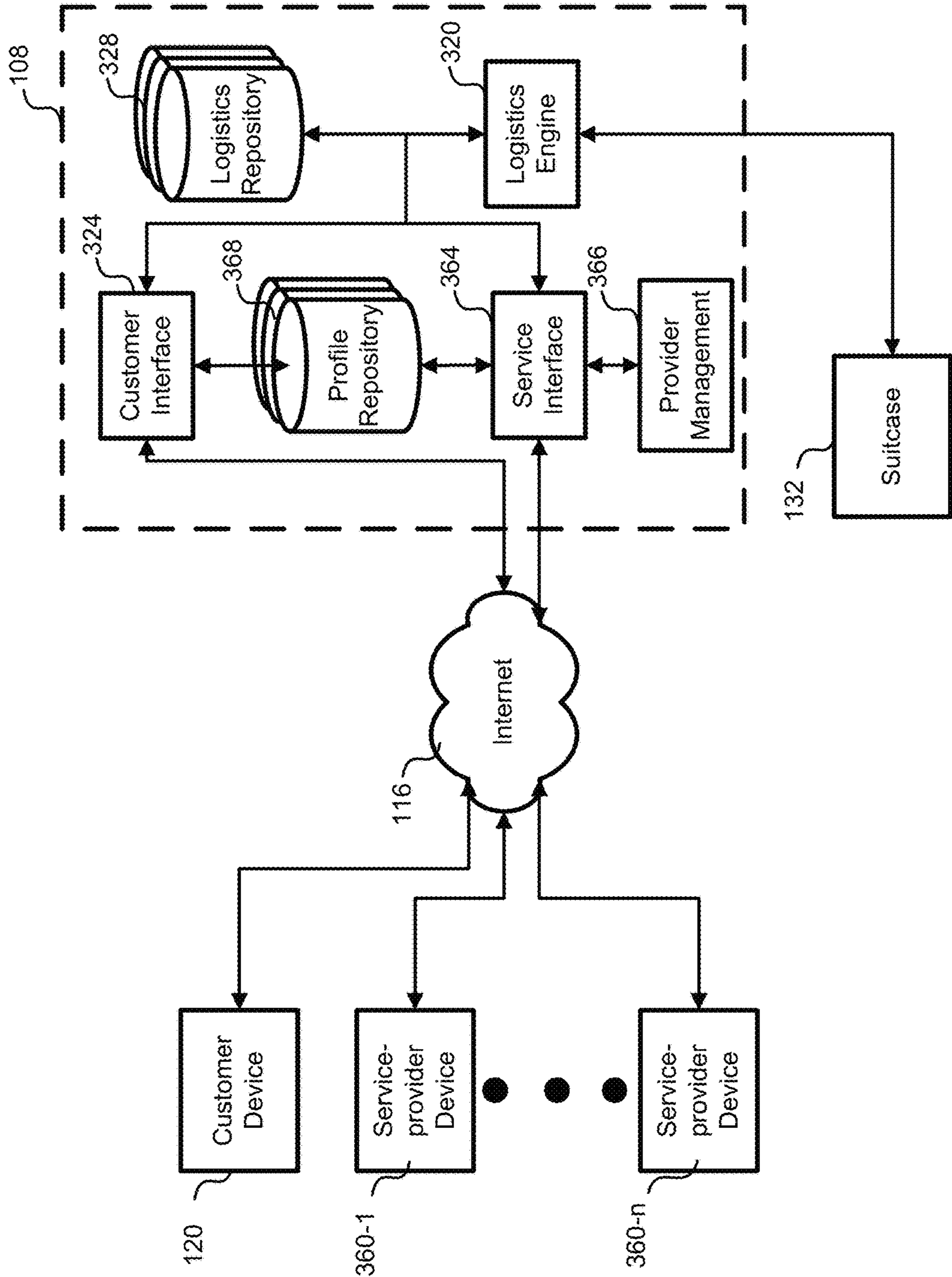


FIG. 3C

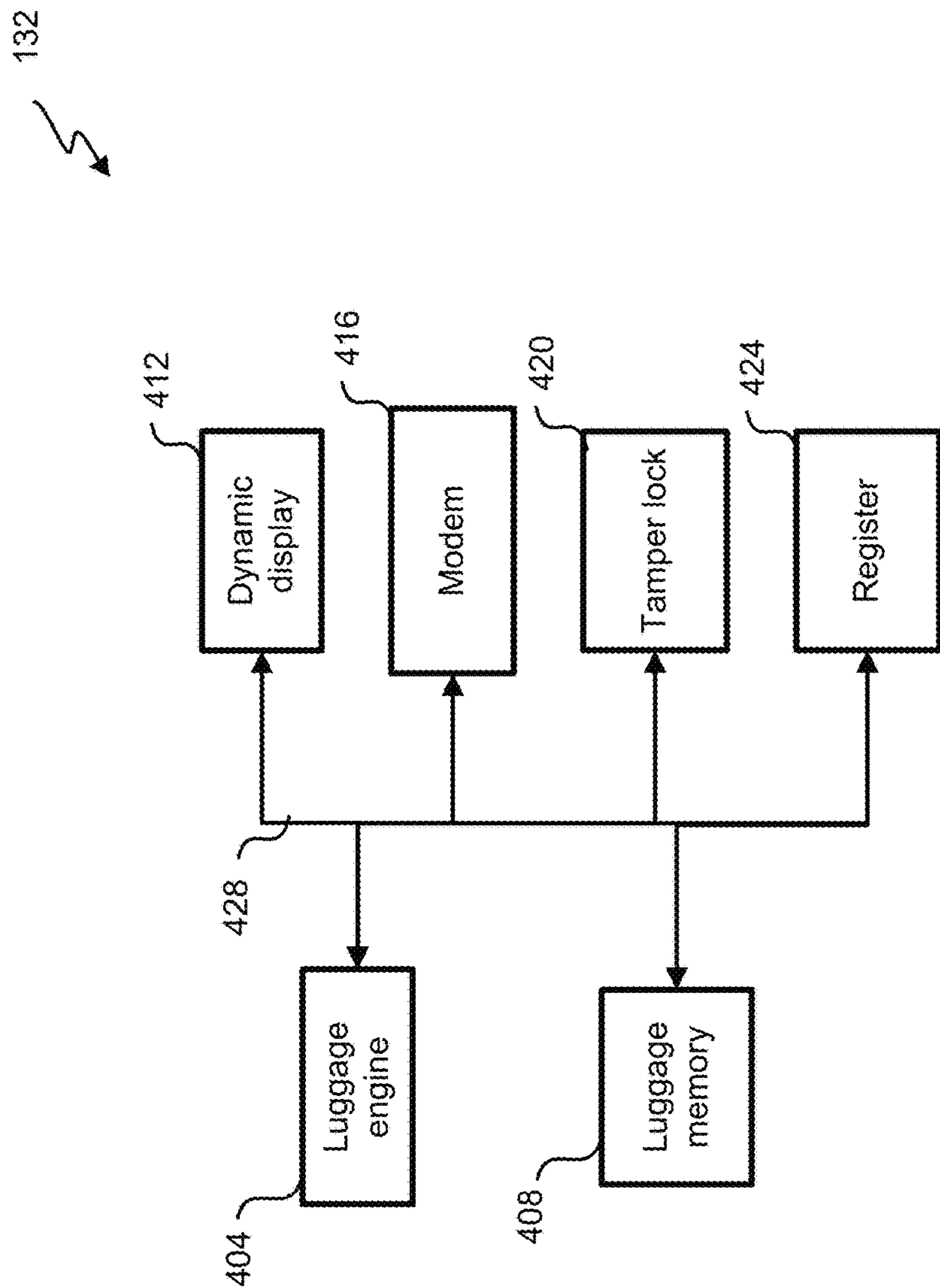


FIG. 4A

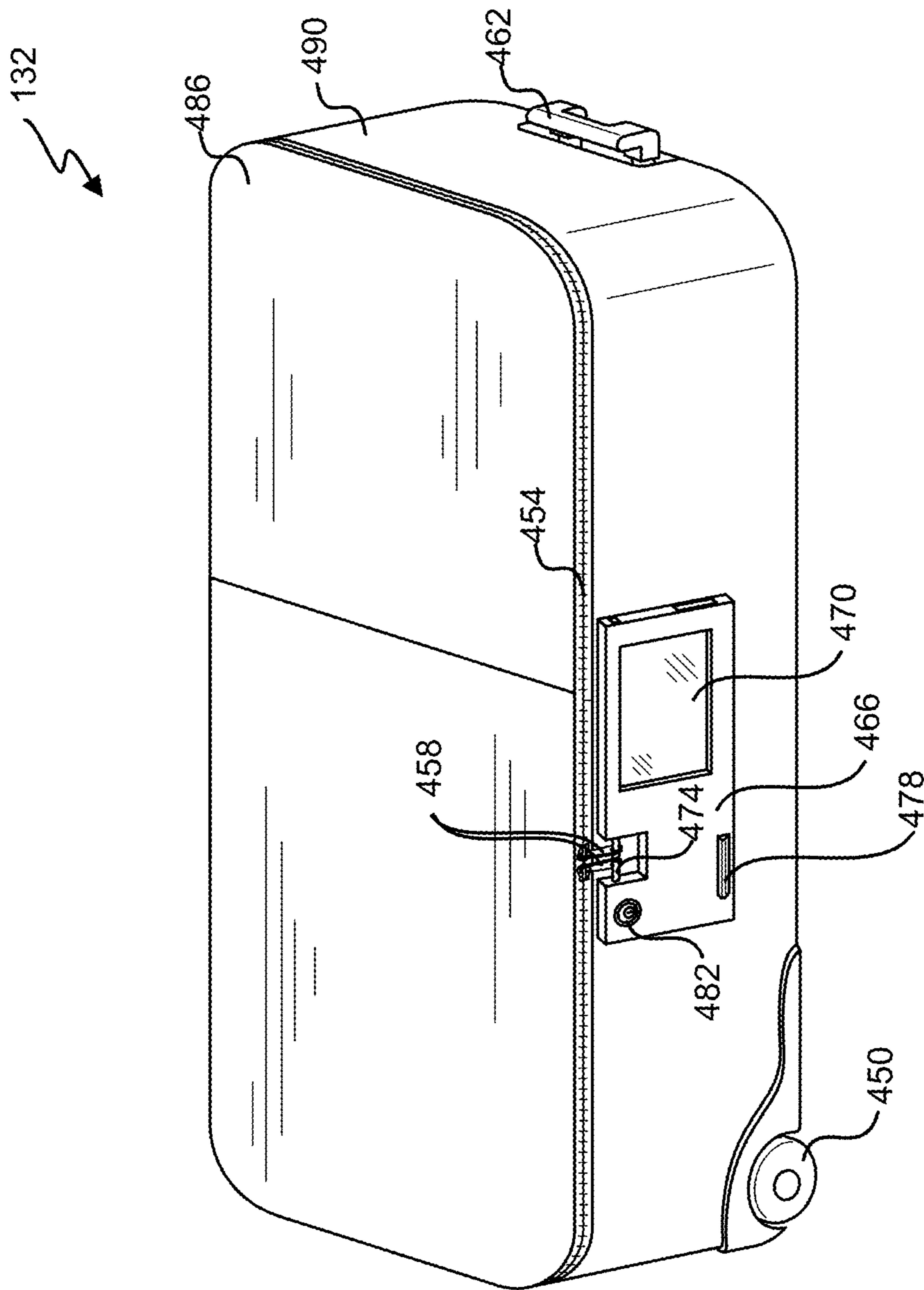


FIG. 4B

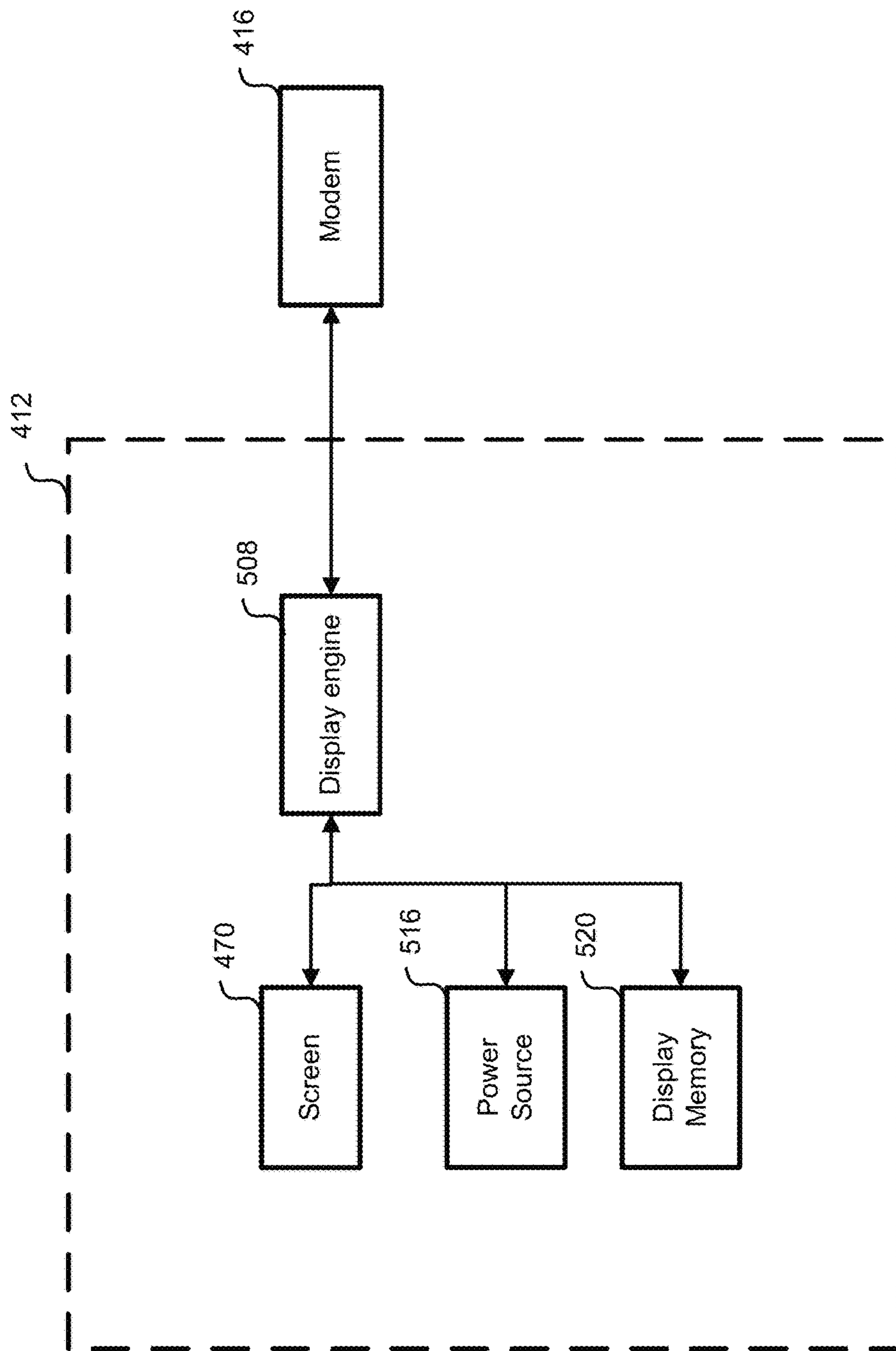


FIG. 5A

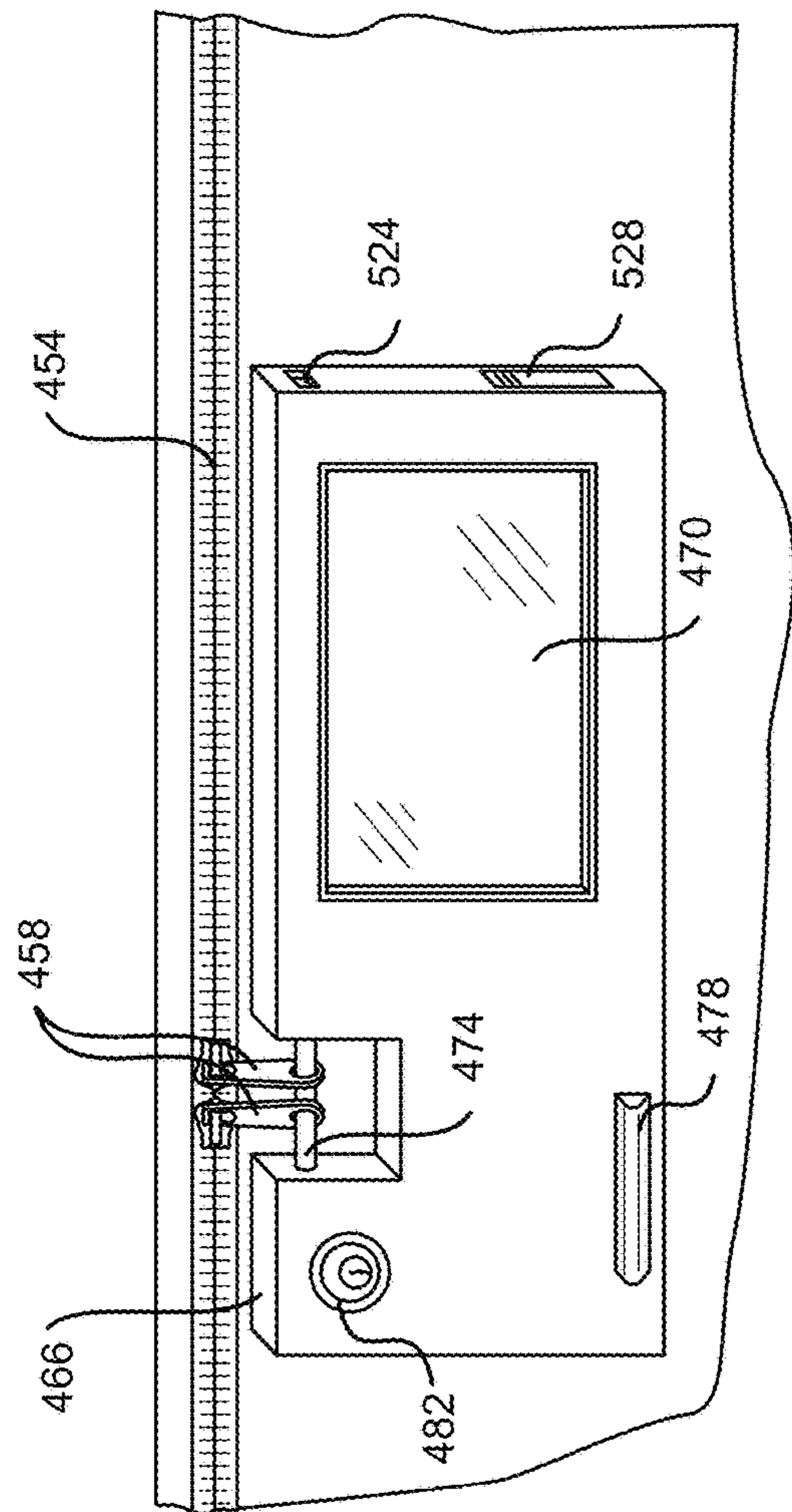


FIG. 5B

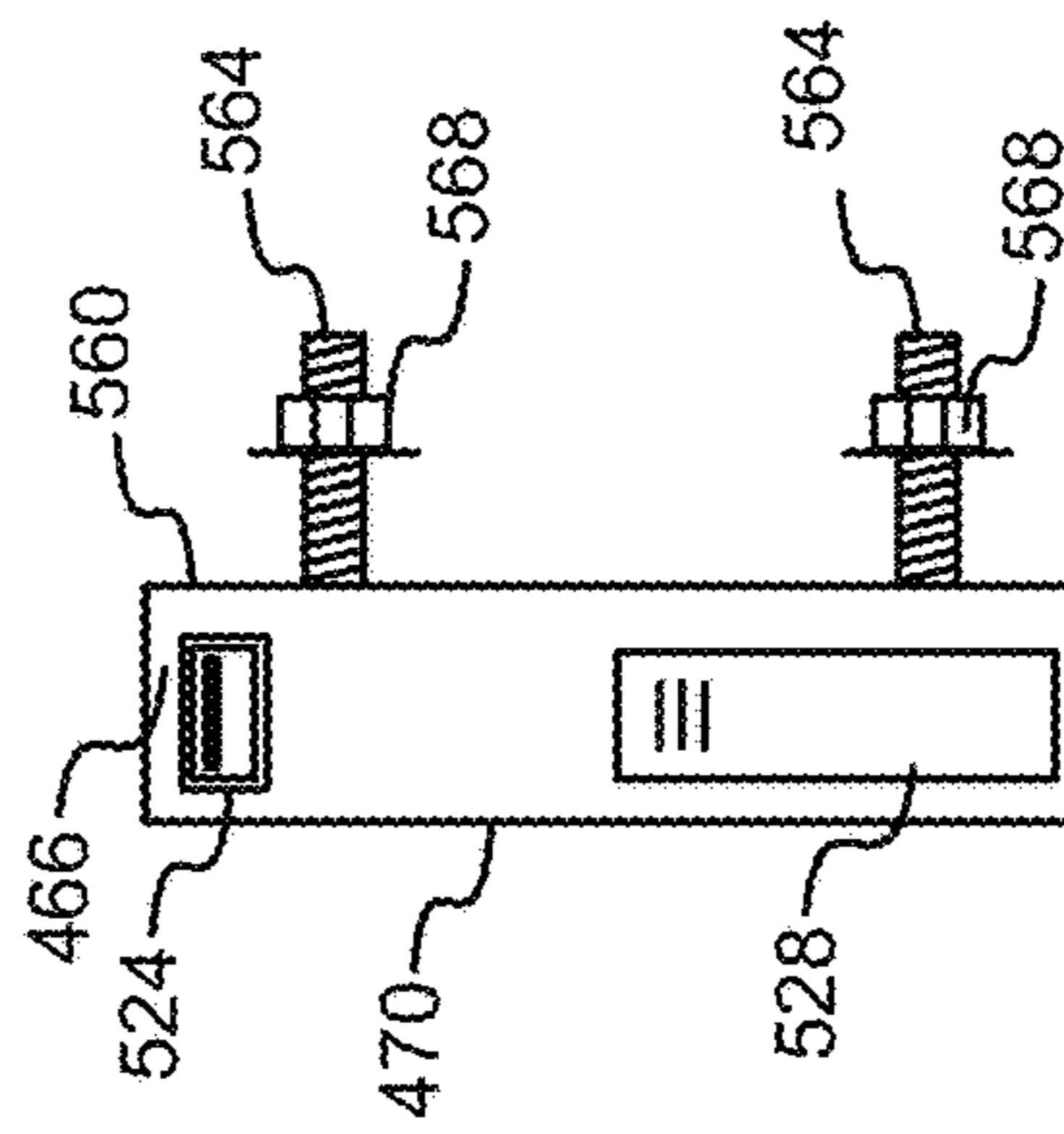
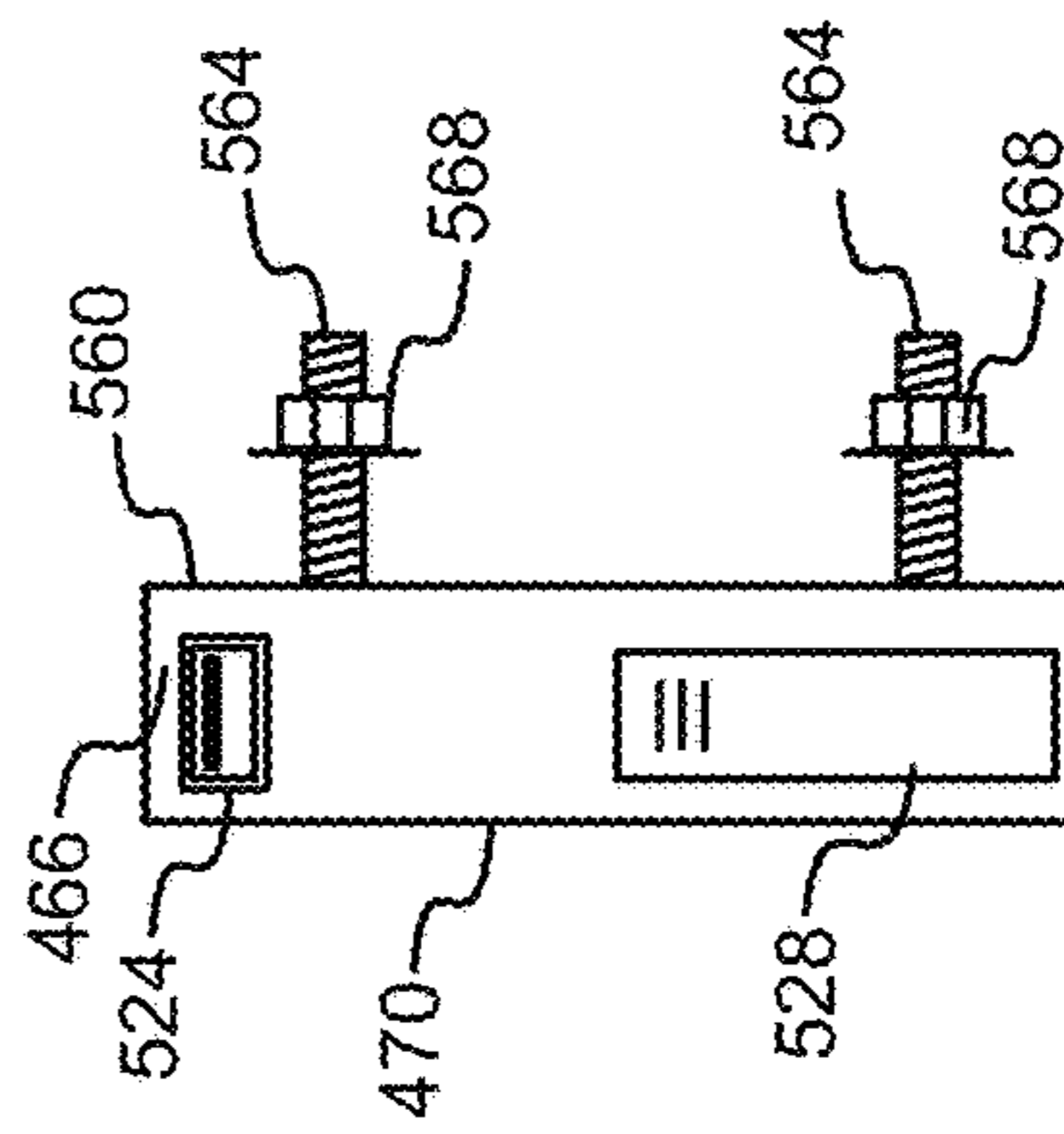


FIG. 5C



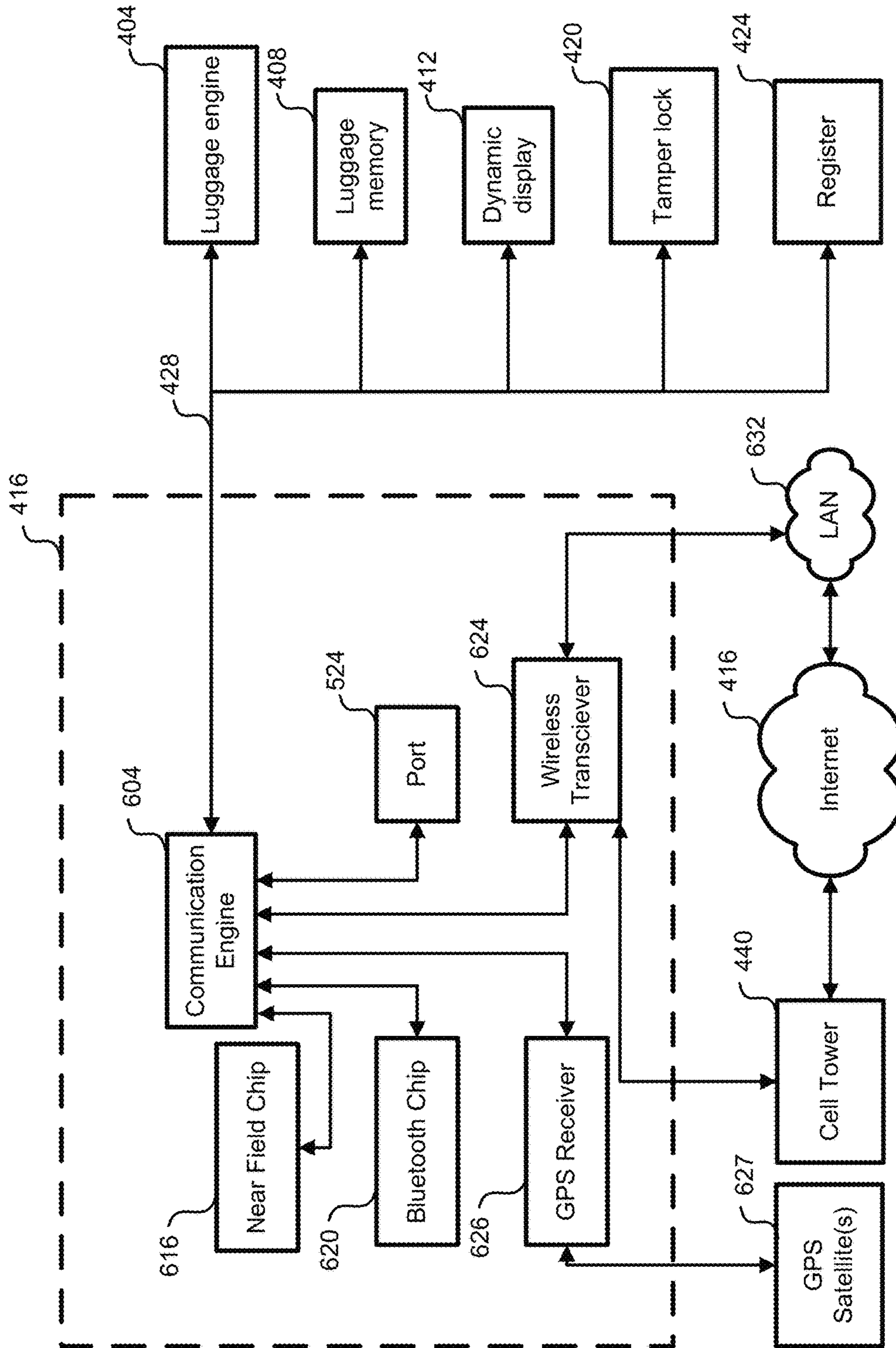


FIG. 6

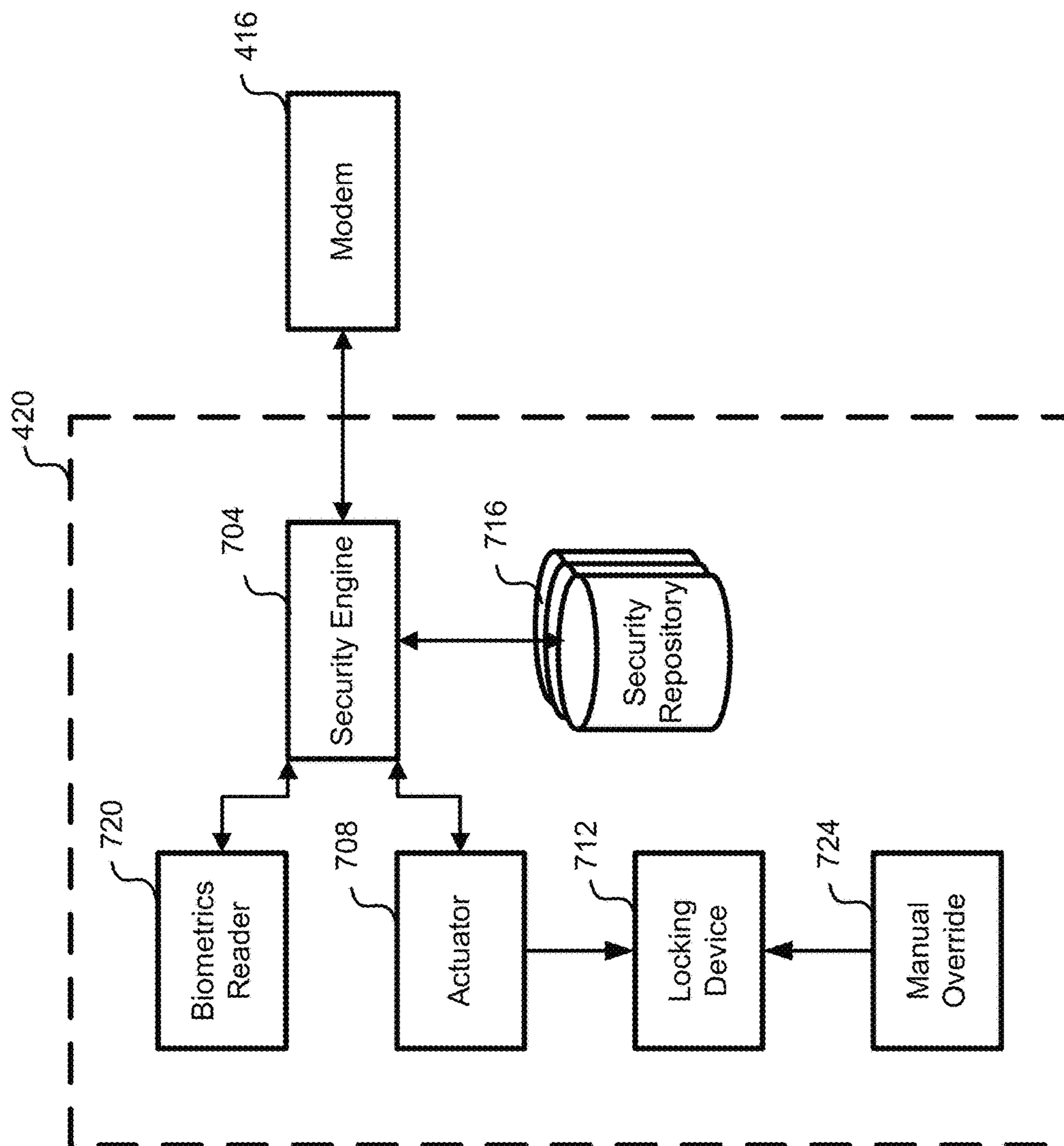


FIG. 7A

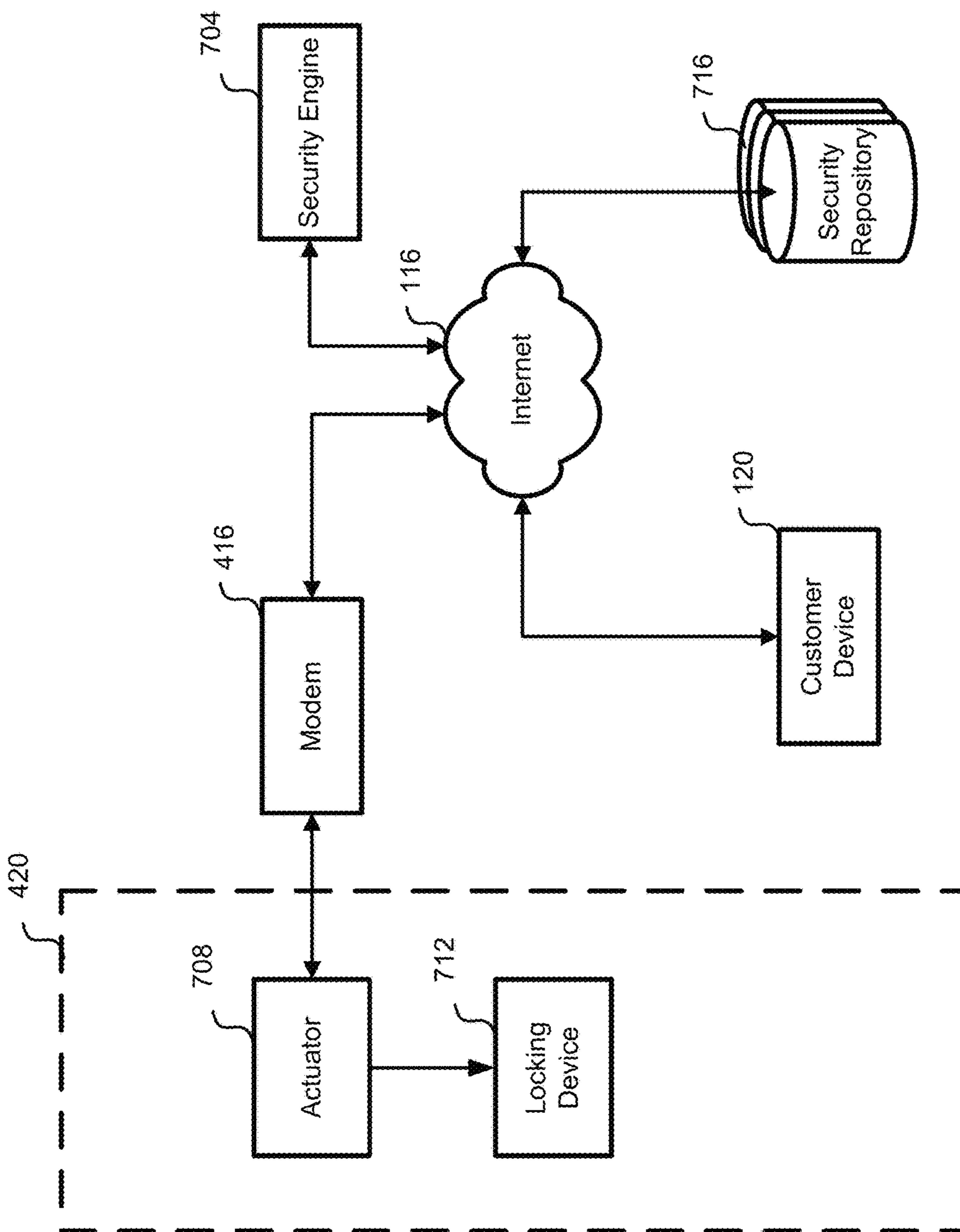


FIG. 7B

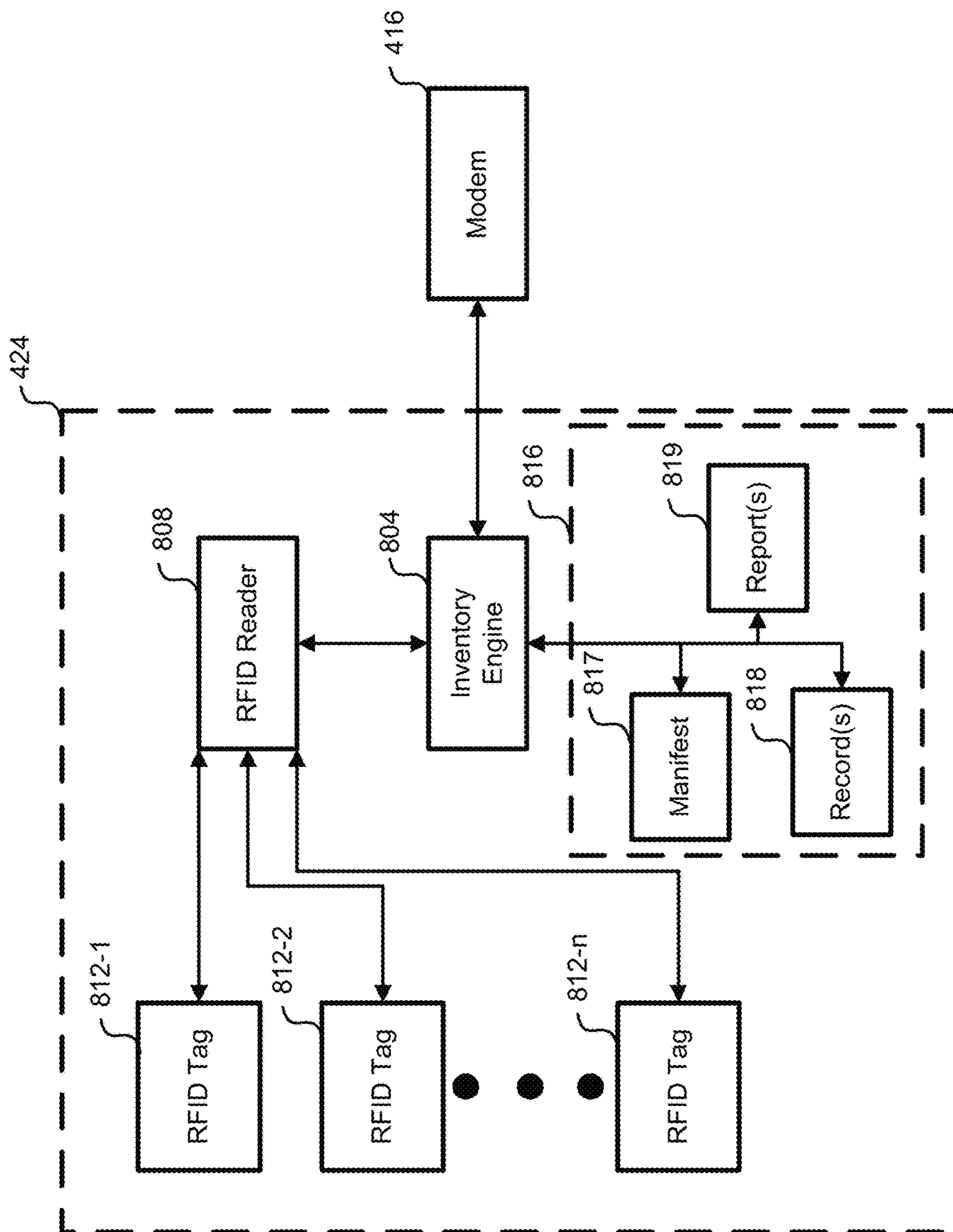


FIG. 8

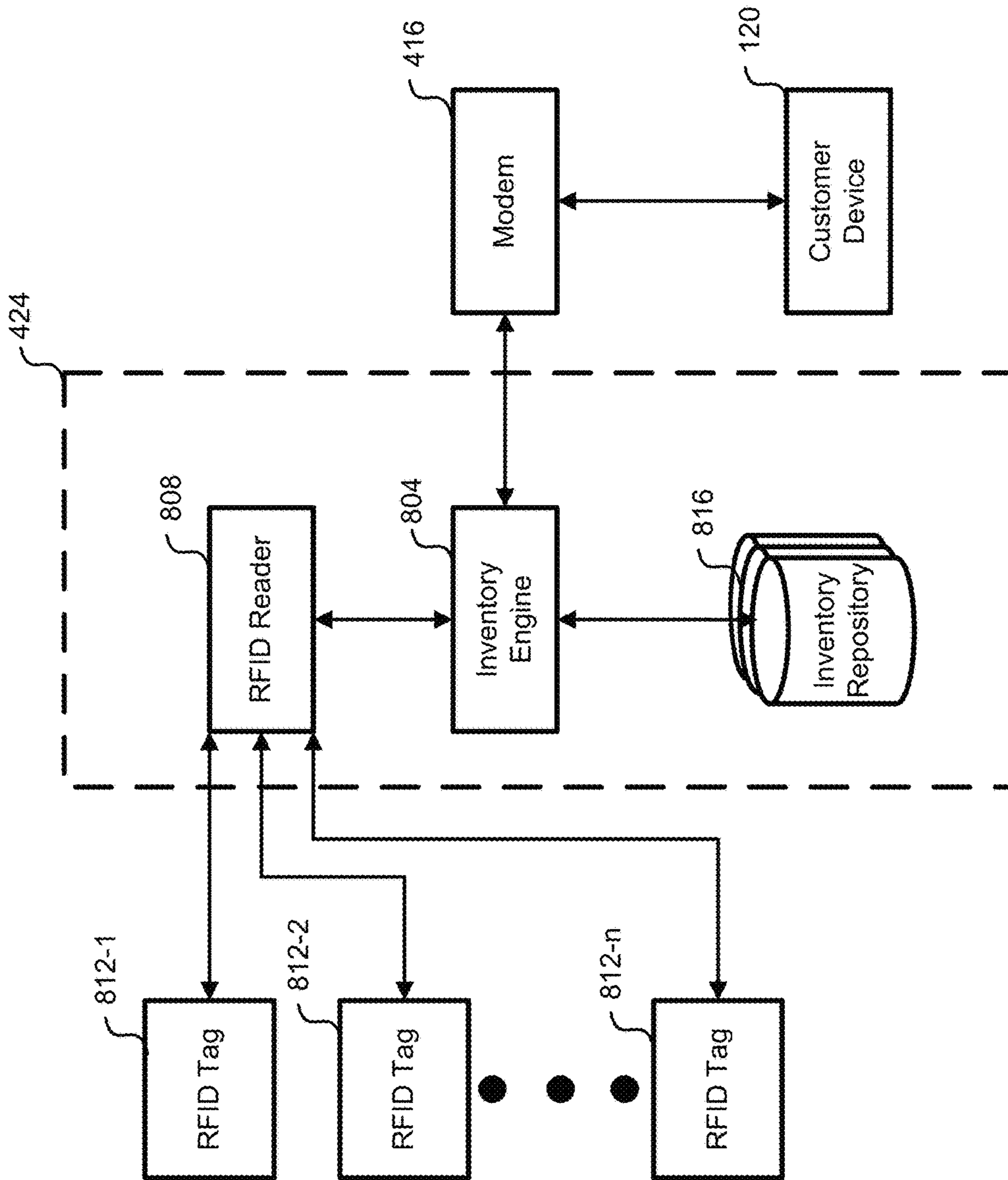


FIG. 9A

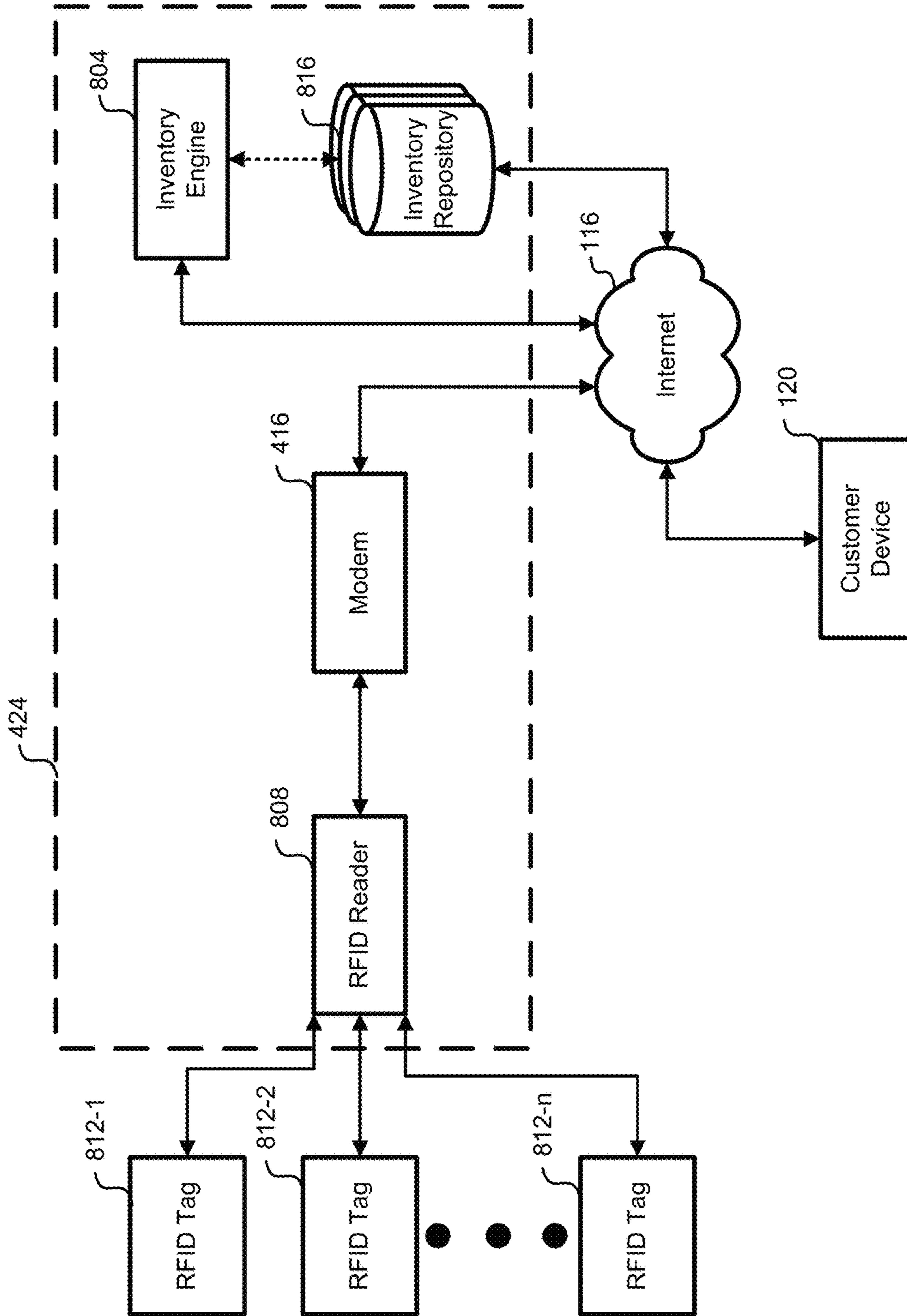


FIG. 9B

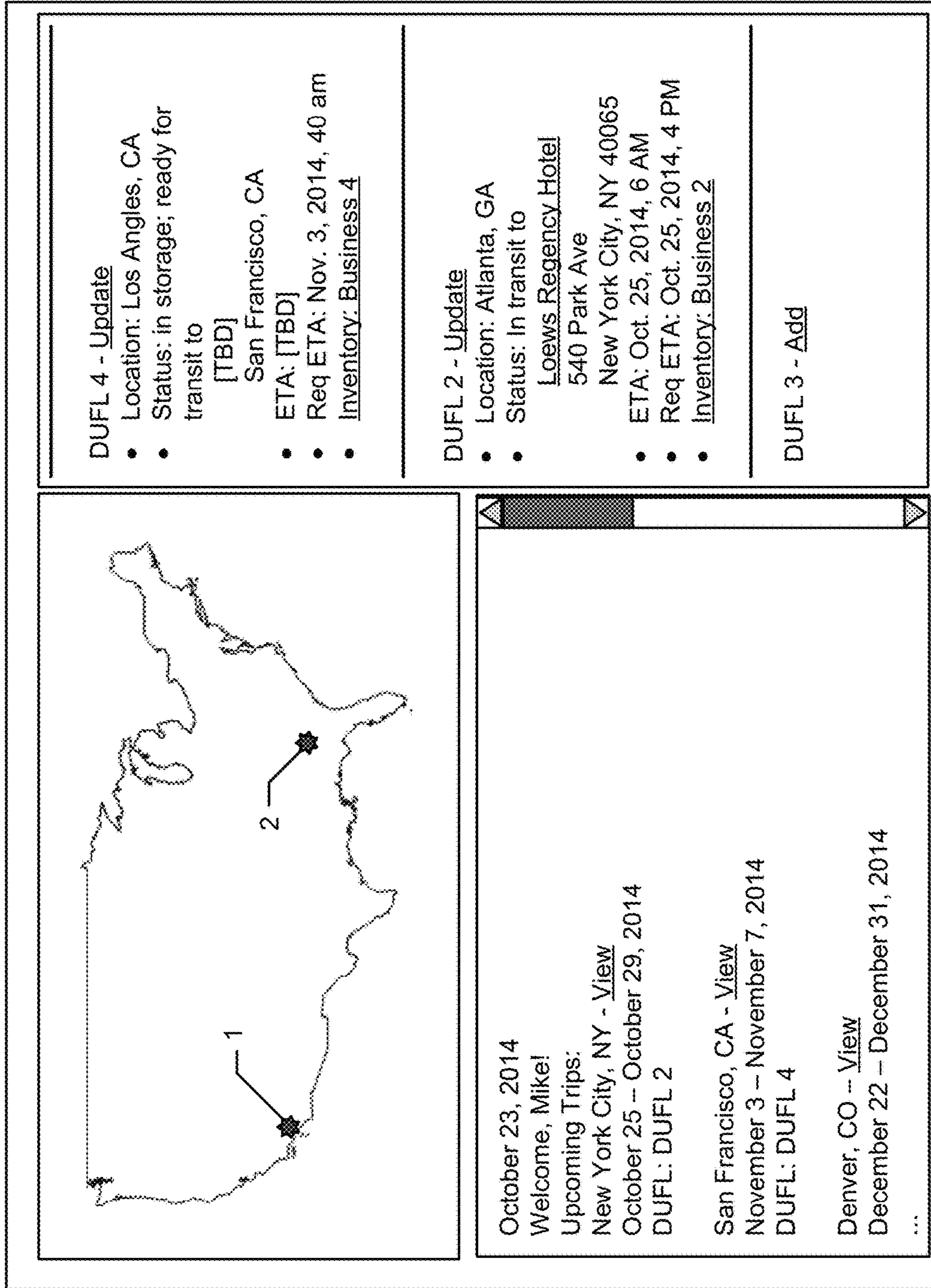


FIG. 10

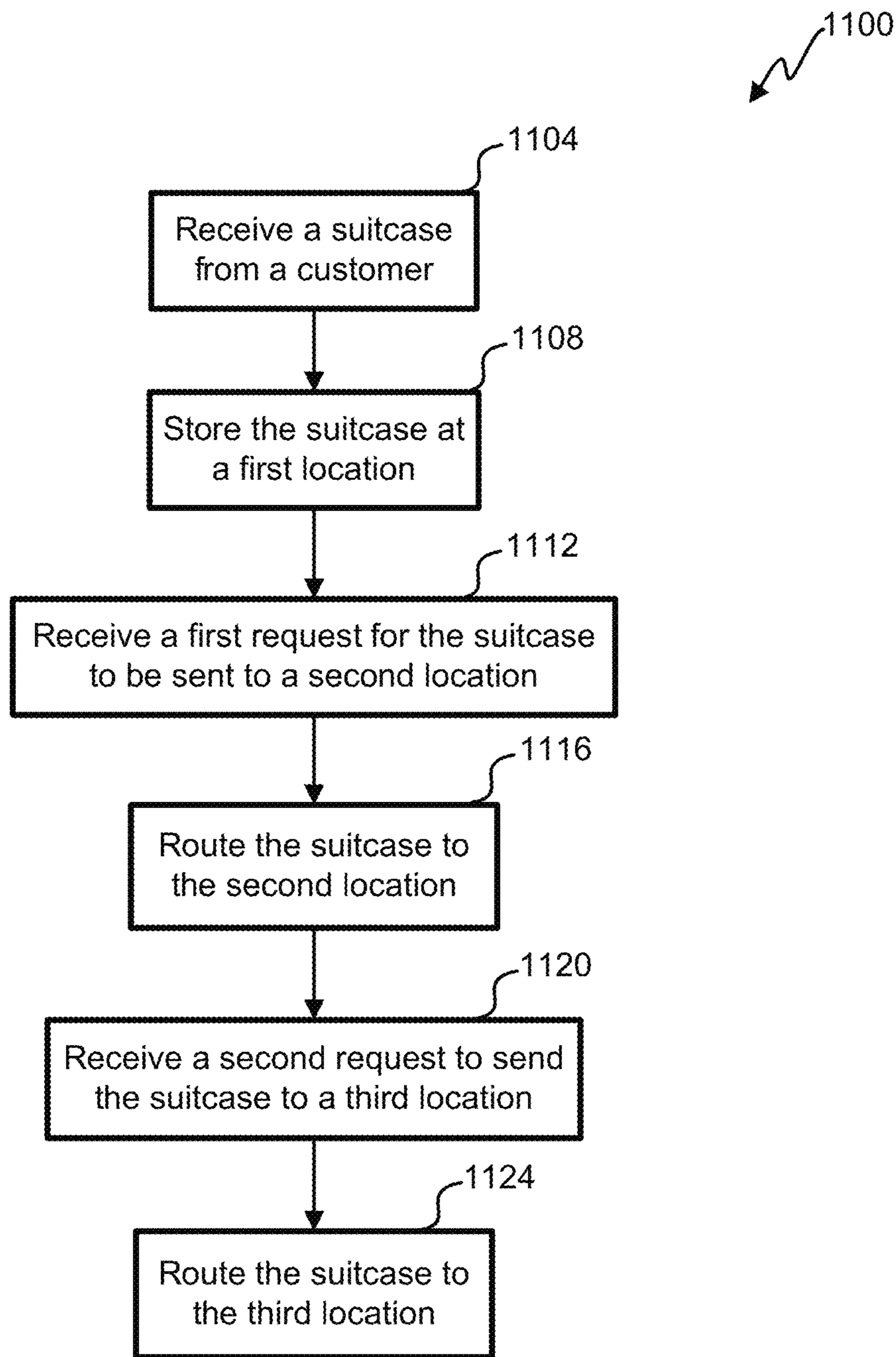


FIG. 11

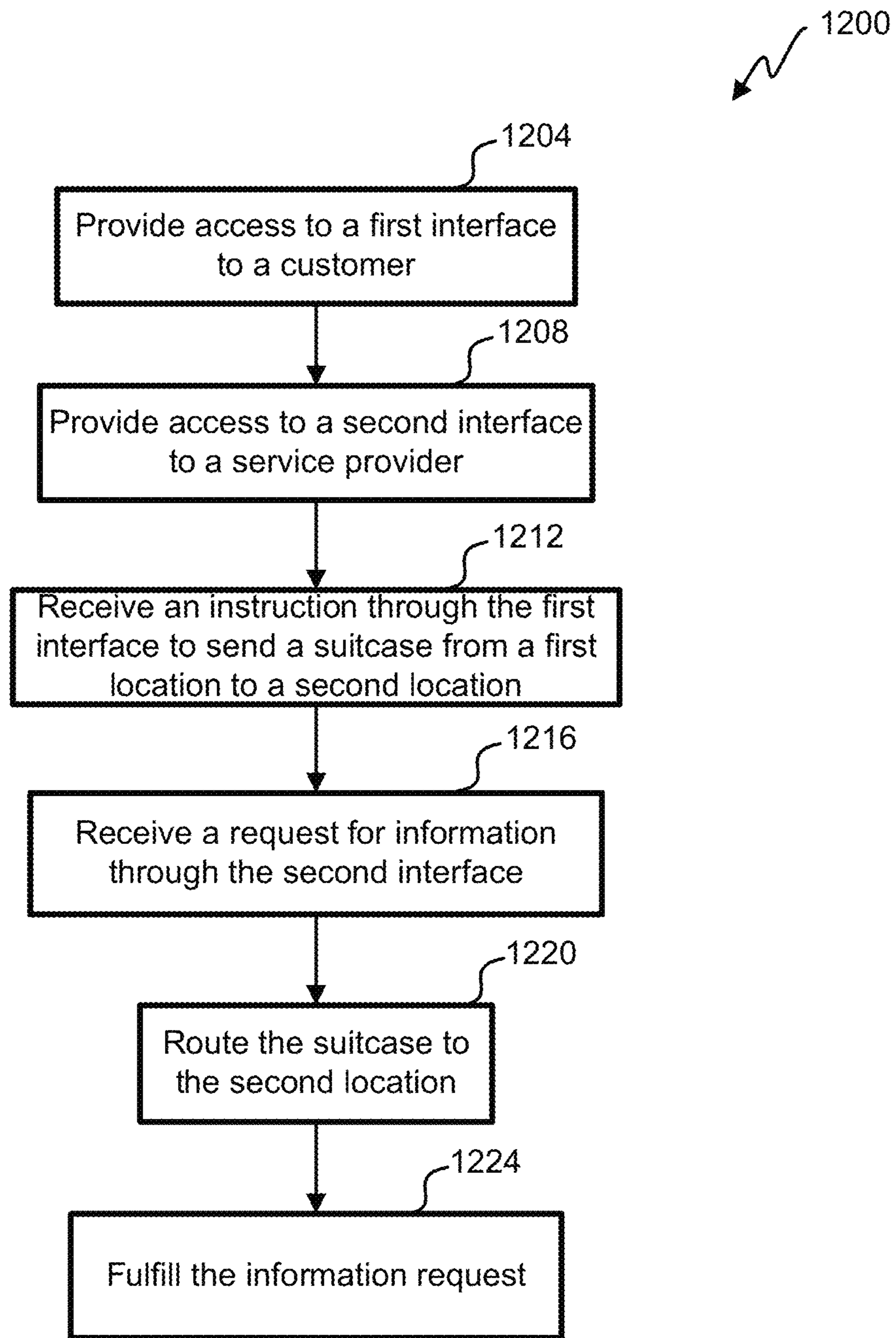


FIG. 12

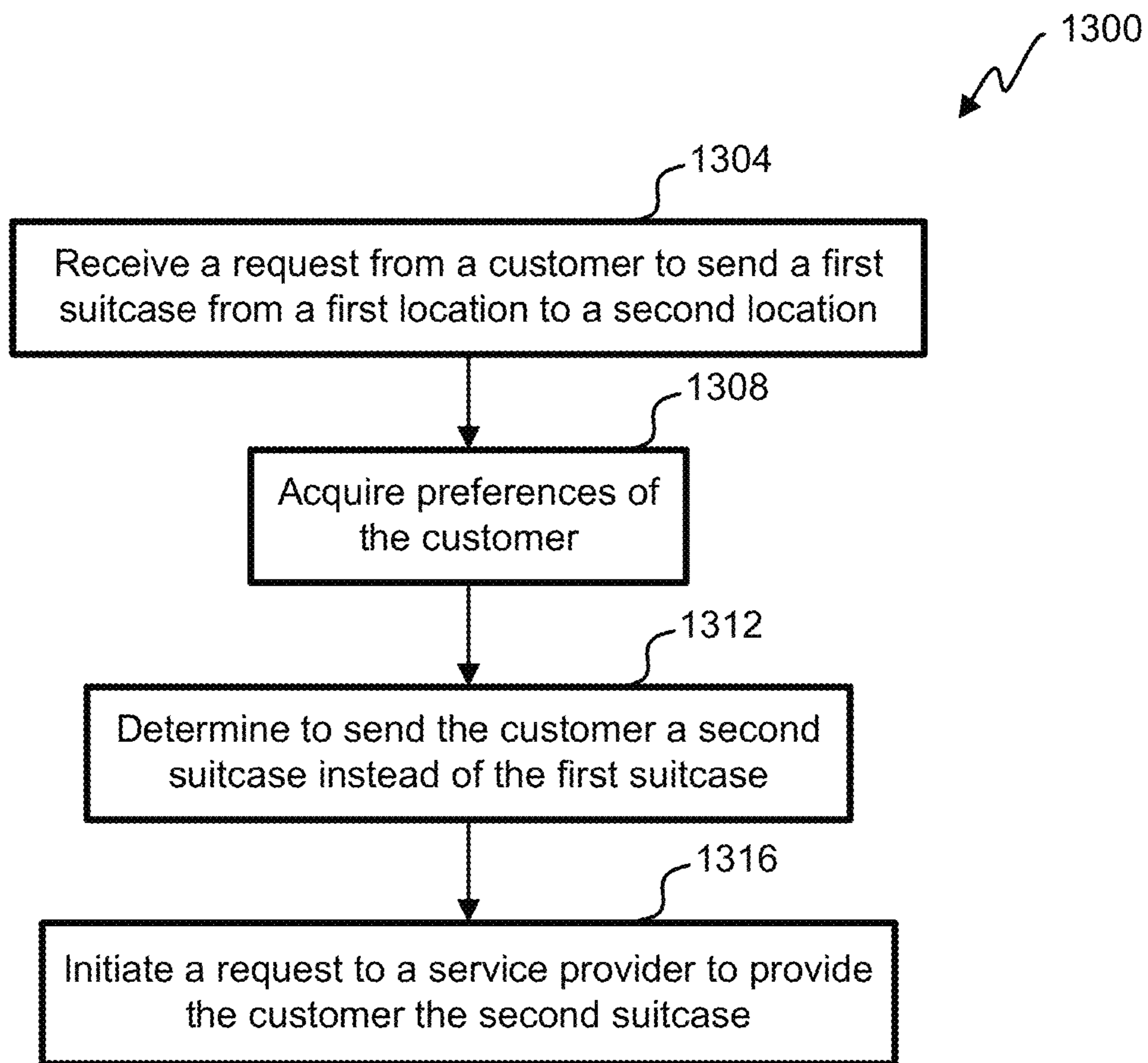


FIG. 13

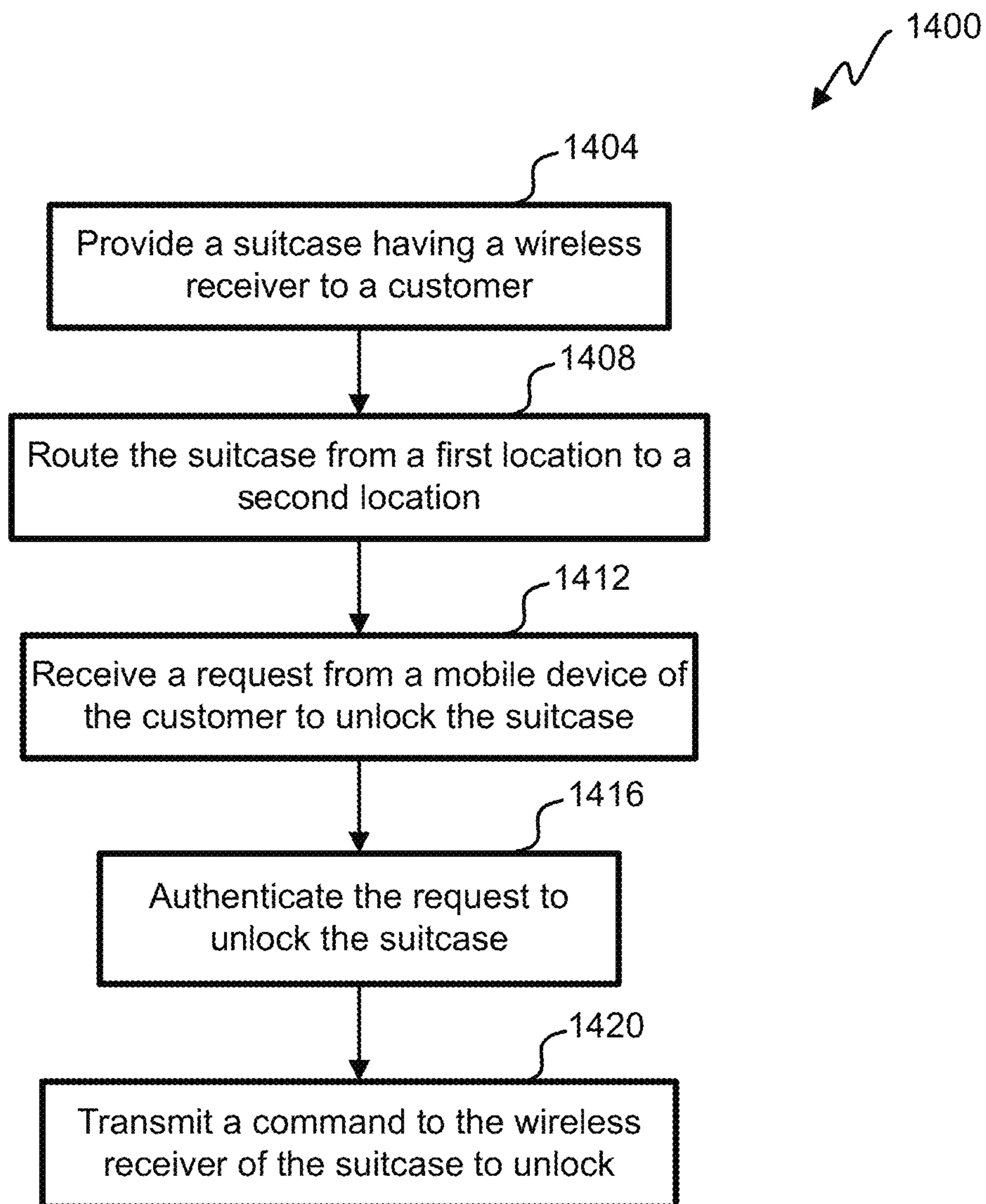


FIG. 14

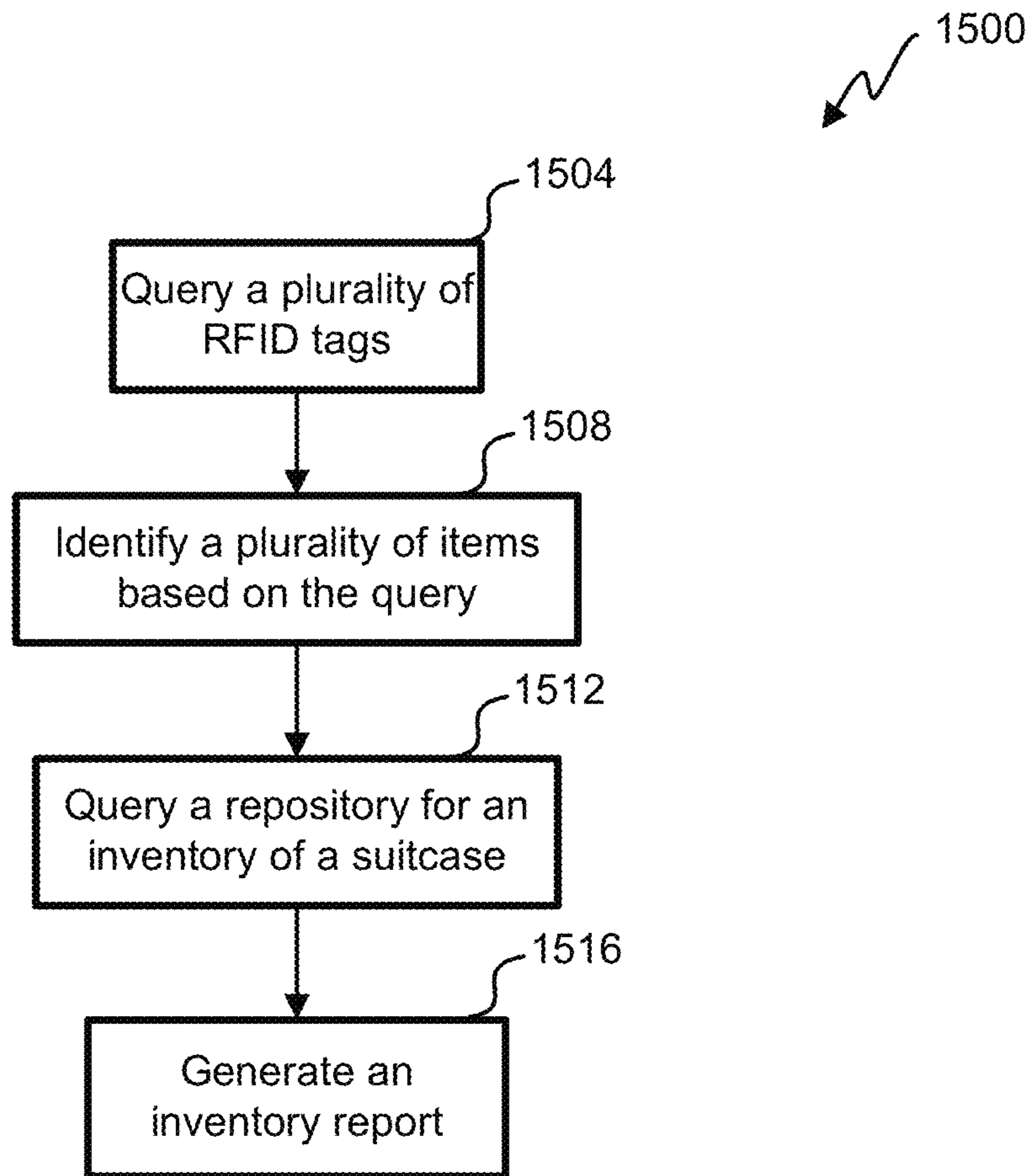


FIG. 15

REGISTER FOR COUNTING AND TRACKING ITEMS IN A BAG

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 14/634,369, filed on Feb. 27, 2015, which application is a continuation of U.S. patent application Ser. No. 14/583,006, filed on Dec. 24, 2014, entitled "REGISTER FOR COUNTING AND TRACKING ITEMS IN A BAG," which application claims priority to U.S. Provisional Patent Application No. 62/056,247, filed on Sep. 26, 2014, the disclosures of which are hereby incorporated by reference in their entirety for all purposes.

BACKGROUND

This disclosure relates in general to registers. Registers are used to record transactions. Some registers include machines and systems for ascertaining a number of movements of various devices. Some registers are used to disclose the numerical extent or quantity of movement of a machine and where the device is separate and independent of the machine whose movements are to be noted; also some machines, such as cash-registers, fare-registers, voting machines, and calculators, have registering or counting devices as elements and have in addition certain other features for a given purpose.

BRIEF SUMMARY

People often use bags (e.g., suitcases) to carry personal items and other items while traveling. In some embodiments, a register is used to count and/or track items of a bag while the bag is routed and items of the bag are processed. For example, a customer selects a plurality of items to put in a suitcase. The customer then sends the suitcase to a processing facility where the plurality of items are logged (e.g., added to a manifest of the suitcase and correlated to the customer) and RFID tags are attached to the plurality of items. For example, an RFID tag (e.g., the size of a grain of rice), is sewn onto a shirt. The suitcase comprises an RFID reader. The customer plans a first trip to a first destination (e.g., New York). The customer requests the suitcase be sent to New York for the customer to have the availability to use the plurality of items while the customer is at the first destination (e.g., for the customer to wear the shirt while the customer is in New York). The suitcase is sent from the processing facility to New York. The customer uses one or more of the plurality of items while the customer is at the first destination. The customer sends the suitcase from the first destination to the processing facility where one or more of the plurality of items are processed (e.g., the shirt is laundered, pressed, and returned to the suitcase). The customer plans a second trip to a second destination (e.g., San Francisco). The customer requests the suitcase be sent to San Francisco for the customer to have the availability to use one or more of the plurality of items while the customer is at the second destination (e.g., for the customer to wear the shirt while the customer is in San Francisco). The suitcase is sent from the processing facility to San Francisco. The customer uses one or more of the plurality of items while the customer is at the second destination (e.g., wears the shirt and a pair of shoes). The customer sends the suitcase from the second destination to the processing facility where one or more of the plurality of items are processed (e.g., the shirt is laun-

dered, pressed, and returned to the suitcase; and the shoes are shined and returned to the suitcase). Thus the processing facility saves the customer time and effort by cleaning and routing the suitcase for the customer (e.g., the customer does not un pack and re-pack the suitcase between trips, and the customer does not take the suitcase through airport security). A register, comprising the RFID reader and the manifest, is used to count and tract the plurality of items of the suitcase.

In some embodiments, a register for counting and tracking items in a bag is disclosed. The register comprises a manifest, an RFID reader, a first report, a second report, and a third report. The manifest comprises a first identification (ID) of a first radio-frequency identification (RFID) tag, wherein the first ID is correlated to an account of a customer, and the first RFID tag is attached to a first item of clothing; and a second ID of a second radio-frequency identification (RFID) tag, wherein the second ID is correlated to the account of the customer, and the second RFID tag is attached to a second item of clothing. The RFID reader is attached to the bag and configured to query the first RFID tag for the first ID; and query the second RFID tag for the second ID. The first report is generated after the bag is sent to a first destination. The first report is generated by identifying a first record, wherein the first comprises the first ID and the second ID from the RFID reader querying the first RFID tag and the second RFID tag; and comparing the first record to the manifest. The second report is generated after the first report. The second report is generated by: identifying a second record, wherein the second record comprises the first ID but not the second ID from the RFID reader querying the first RFID tag but not the second RFID tag; and comparing the second record to the manifest. The second report identifies the second item of clothing is missing from the bag based on the second ID missing from the second report. The third report is generated after the second report. The third report is generated by: identifying a third record, wherein the third record comprises the first ID and the second ID from the RFID reader querying the first RFID tag and the second RFID tag; and comparing the third record to the manifest. In some embodiments, the register comprises a modem for sending the manifest and/or one or more reports from the bag to a computing device (e.g., desktop and/or mobile device) via the Internet. In some embodiments, reports comprise images of items in the bag.

In some embodiments, a method for counting and tracking items in a bag using a register is disclosed. A bag is received from a customer, the bag comprising a first item of clothing and a second item of clothing. A first RFID tag is attached to the first item of clothing, the first RFID tag having a first ID that is unique to the first RFID tag. A second RFID tag is attached to the second item of clothing, the second RFID tag having a second ID that is unique to the second RFID tag. The first ID is correlated with an account of the customer. The second ID is correlated with the account of the customer. A manifest is created for the bag, wherein: the manifest comprises the first ID; the manifest comprises the second ID; and the manifest is correlated to the account of the customer. The bag is sent to a first destination. A first record of the bag is generated using an RFID reader attached to the bag, wherein the first record is generated by the RFID reader querying the first RFID tag and the second RFID tag. A first report is generated by comparing the first record to the manifest. The first report is transmitted to a device of the customer. The first item is removed from the bag. The first item is cleaned and returned to the bag after cleaning. A second record is generated after returning the first item to the bag after cleaning, wherein the

second record is generated by the RFID reader querying the first RFID tag and the second RFID tag. The second record is compared to the manifest to generate a second report. In some embodiments, the second record is generated to verify items that were removed from the bag for cleaning were returned. The second report is transmitted to the device of the customer.

In some embodiments, a method for counting and tracking items in a bag using a register is disclosed. A bag received from a customer is identified, the bag comprising a first item of clothing and a second item of clothing. A first RFID tag is identified, wherein the first RFID tag is attached to the first item of clothing, the first RFID tag having a first ID that is unique to the first RFID tag. A second RFID tag is identified, wherein the second RFID tag is attached to the second item of clothing, the second RFID tag having a second ID that is unique to the second RFID tag. The first ID is correlated with an account of the customer. The second ID is correlated with the account of the customer. A manifest for the bag is created, wherein the manifest comprises the first ID; the manifest comprises the second ID; and the manifest is correlated to the account of the customer. A first record of the bag is generated using an RFID reader attached to the bag, wherein the first record is generated by the RFID reader querying the first RFID tag and the second RFID tag. A first report is generated by comparing the first record to the manifest. Instructions are provided to a cleaner for cleaning the first item of clothing. A second record is generated after the first item is returned to the bag after cleaning, wherein the second record is generated by the RFID reader querying the first RFID tag and the second RFID tag. The second record is compared to the manifest to generate a second report. The second report is transmitted to a device of the customer.

Further areas of applicability of the present disclosure will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples, while indicating various embodiments, are intended for purposes of illustration only and are not intended to necessarily limit the scope of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

The present disclosure is described in conjunction with the appended figures.

FIG. 1A depicts a block diagram of an embodiment of a logistics system interacting with processing facilities, suitcases, customer devices, and service providers.

FIG. 1B depicts a block diagram of an embodiment of a logistics system interacting with different service providers.

FIG. 2 depicts a block diagram of an embodiment of a processing facility.

FIG. 3A depicts a block diagram of an embodiment of a system for storage and delivery of the suitcase from a storage facility.

FIG. 3B depicts a block diagram of an embodiment of a system for storage and delivery of the suitcase in collaboration with service providers.

FIG. 3C depicts a block diagram of an embodiment of a system for storage and delivery of the suitcase having multiple interfaces for different users.

FIGS. 4A and 4B depict simplified diagrams of embodiments of a suitcase for delivery from a storage facility.

FIGS. 5A, 5B, and 5C depict simplified diagrams of embodiments of a dynamic display used with the suitcase.

FIG. 6 depicts a block diagram of an embodiment of a modem of the suitcase.

FIG. 7A depicts a block diagram of an embodiment of a tamper lock of the suitcase.

FIG. 7B depicts a block diagram of another embodiment of the tamper lock of the suitcase.

FIG. 8 depicts a block diagram of an embodiment of a register of the suitcase.

FIG. 9A depicts a block diagram of an embodiment of a real-time, inventory display system for the suitcase.

FIG. 9B depicts a block diagram of another embodiment of register of the suitcase.

FIG. 10 depicts a simplified diagram of a customer interface for managing shipping of one or more suitcases.

FIG. 11 illustrates a flowchart of an embodiment of a process for routing a suitcase for delivery.

FIG. 12 illustrates a flowchart of an embodiment of a process for routing a suitcase for delivery using multiple interfaces.

FIG. 13 illustrates a flowchart of an embodiment of a process for providing a second suitcase to a customer when a first suitcase is unavailable.

FIG. 14 illustrates a flowchart of an embodiment of a process for unlocking a suitcase with a mobile device.

FIG. 15 illustrates a flowchart of an embodiment of a process for tracking items in a suitcase.

In the appended figures, similar components and/or features may have the same reference label. Further, various components of the same type may be distinguished by following the reference label by a dash and a second label that distinguishes among the similar components. If only the first reference label is used in the specification, the description is applicable to any one of the similar components having the same first reference label irrespective of the second reference label.

DETAILED DESCRIPTION

The ensuing description provides preferred exemplary embodiment(s) only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the preferred exemplary embodiment(s) will provide those skilled in the art with an enabling description for implementing a preferred exemplary embodiment. It is understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope as set forth in the appended claims.

Embodiments are generally, and without limitation, related to devices, systems, and methods that allow one or more customers to travel with a benefit of one or more suitcases, personal item(s), and/or other luggage items and content (generally referred to in this application as luggage), but without carrying the luggage and/or otherwise addressing some or all of luggage handling requirements when travelling from one location to one or more other locations (e.g., traveling from a start location a destination). More specifically, but without limitation, a customer provides a suitcase, the suitcase typically comprising contents; the suitcase is stored at a storage location, for example a storage facility (i.e., a location away from the start location); and after the customer identifies, either directly or indirectly, a destination, the suitcase is sent to the destination. In some embodiments, the storage facility not a place where the customer regularly receives mail (e.g., the customer may regularly receive mail at a residence or business). The customer may identify the destination before or during travel from the start location to the destination. In some embodiments, the customer identifies the destination after the

suitcase is stored at the storage location and before the customer leaves the start location. In some embodiments, the customer identifies the destination explicitly or identifies the destination indirectly by identifying a travel itinerary, service provider, reservation, and/or other indicator of travel and the like. The suitcase is sent (either directly or indirectly) from the storage location to the destination. The suitcase is returned to the storage location, to another location, or may be delivered to a subsequent destination. In some embodiments, suitcase contents are processed (e.g., cleaned, ironed, polished), replaced and/or replenished before the customer arrives at a destination. In some embodiments, processing, replacing, and/or replenishing suitcase contents saves the customer time and/or provides the customer with a diversity of contents, and/or provides more total contents over a duration of travel.

FIG. 1A depicts a block diagram of an embodiment of a logistics system interacting with processing facilities, suitcases, customer devices, and service providers. Logistic-system servers **104** are part of a logistics system **108**. The logistic-system server **104** communicates through routers **112**, as part of the Internet **116**, with customer devices **120**, service providers **124**, processing facilities **128**, and suitcases **132**. The logistics system **108** coordinates delivery and/or processing of one or more suitcases **132**. The routers **112** transmit data (e.g., data packets) through the Internet **116** between the logistic-system server **104**, customer devices **120**, service providers **124**, processing facilities **128**, and/or suitcases **132**. Though only one server shown for the logistic-system server **104**, it is to be understood that one or more logistic-system servers **104** could be used. Similarly, throughout this description, if one server is depicted and/or discussed, one or more servers could be used.

The processing facility **128** receives the suitcase **132** and creates a manifest comprising items of a suitcase **132**. In some embodiments, an image is taken of each item of a suitcase **132**, and images are part of the manifest. The processing facility **128** correlates the manifest and/or the suitcase **132** to an account of a customer. In some embodiments, processing facilities **128** are geographically spread to reduce shipment costs and/or facility costs. A customer uses a customer device **120** (e.g., desktop, laptop, and/or mobile device such as a smart phone) to request delivery of a suitcase **132**, receive updates regarding the suitcase **132**, and/or to provide instructions regarding the suitcase **132** (e.g., for shirts to be cleaned and/or mended). In some embodiments, a customer device **120** is connected by a local area network (LAN) to the Internet **116** (e.g., a first customer device **120-1** connected to a first LAN **136-1**). In some embodiments, a customer device **120** is connected to the Internet **116** by a cell tower **140** (e.g., an nth customer device **120-n** connected to a first cell tower **140-1**).

Service providers **124** are used for reference (e.g., social media used by a customer to help determine customer likes), processing items of the suitcase **132** (e.g., cleaning), and/or delivery of the suitcase **132** (e.g., a courier service).

In some embodiments, the suitcase **132** communicates with the logistic-system server **104** (e.g., through a modem). The logistic-system server **104** receives information from the suitcase **132** (e.g., GPS data, inventory, etc.), and/or provides instructions to the suitcase **132** (e.g., for the suitcase **132** to display a mailing label on a screen or to unlock). In some embodiments, a suitcase **132** is connected by a LAN **136** to the Internet **116** (e.g., a first suitcase **132-1** connected to a second LAN **136-2**). In some embodiments,

a suitcase **132** is connected to the Internet **116** by a cell tower **140** (e.g., an nth suitcase **132-n** connected to a second cell tower **140-2**).

FIG. 1B depicts a block diagram of an embodiment of a logistics-system server **104** interacting, over the Internet **116**, with different service providers **124**. Examples of service providers **124** include a storage facility **150**, a dry cleaner **154**, a hotel **158**, a courier service **162**, a package-delivery service **166**, an airline **170**, and a social-media service **174**. In this embodiment, the logistic-system server **104** transmits and/or receives data from a server of the storage facility **150**, a server of the dry cleaner **154**, a server of the hotel **158**, a server of the courier service **162**, a server of the package-delivery service **166**, a server of the airline **170**, and/or a server of the social-media service **174**. In some embodiments, the logistics system **108** transmits data and/or receives data from a service provider **124** without going through a server of the service provider (e.g., transmitting data to a service provider **124** having a computing device [e.g., personal computer, tablet] connected to the Internet **116**) because the service provider **124** does not have a server and/or the server of the service provider **124** is bypassed (e.g., a mobile app is provided to the service provider **124**).

FIG. 2 depicts a block diagram of an embodiment of a processing facility **128**. The processing facility **128** comprises a local area network (LAN) **204** connected to the Internet **116** through an internet-service provider **208**. Connected to the LAN are one or more cameras **212**, one or more RFID scanners **216**, one or more barcode scanners **220**, one or more processing-facility servers **224**, one or more web-connected terminals **228**, and/or one or more mobile devices **232**. The processing-facility server **224** is connected to an image storage **236** and an inventory database **240**. The processing facility further comprises storage space **244** for suitcases **132**, RFID tags **248**, and sorting equipment **252**.

A suitcase **132** is received at the processing facility **128**. The camera **212** is used to take pictures of items in the suitcase **132** to create a manifest for the suitcase **132**. RFID tags **248** and/or barcodes are secured to items in the suitcase **132**. The RFID scanner **216** and/or barcode scanner **220** are used to read the RFID tags **248** and/or barcodes. In some embodiments, RFID tags **248** are used instead of barcodes so that multiple RFID tags **248** can be read at once, speeding up an inventory process. Pictures of items of the suitcase **132** are stored in the image storage **236**. Manifests are stored in the inventory database **240**. In some embodiments, the mobile device **232** is used to perform functions of the camera(s) **212**, RFID scanner(s) **216**, and/or barcode scanner(s) **220**. In some embodiments, the processing facility **128** stores suitcases **132** instead of a storage facility **150** operated by a third party (wherein the processing facility **128** and the logistics system **108** are operated by a common entity). In some embodiments, sorting equipment **252** is used to sort suitcases **132** going to different locations and/or sorting items for different suitcases **132** (e.g., sending and receiving items from multiple suitcases **132** to and from the dry cleaner **154**).

Referring next to FIG. 3A, a block diagram of an embodiment of a system for storage and delivery of the suitcase **132** from a storage facility is shown. In FIG. 3A, a logistics system **108**, a customer device **120**, a storage facility **150**, a plurality of package-delivery services **166**, and the suitcase **132** are connected to each other via the Internet **116**.

The logistics system **108** comprises a logistics engine **320**, a customer interface **324**, and a logistics repository **328**. The customer device **120** interacts with the logistics system **108** through the customer interface **324**. The customer

places personal items in the suitcase **132** and the suitcase **132** is sent to the storage facility **150**. The storage facility **150** is a location different from the start location of the customer. In some embodiments, the storage facility **150** is a storage facility. Through the customer interface **324**, the customer is able to request the suitcase **132** be delivered to a destination. In some embodiments the customer provides a sequence or partial sequence of destinations, an itinerary, a partial destination such as a city but not a specific location within the city, or other destination-related information. In some embodiments the customer changes previously provided destination-related information, and optionally is able to change all previously-provided destination-related information or only some; for example, previously-provided destination-related information that cannot be changed may appear grayed-out or is otherwise indicated to the customer. The logistics engine **320** communicates with the storage facility **150** and one or more package-delivery services **166** to deliver the suitcase **132** from the storage facility **150** to the destination. Information about routing and deliveries is stored in the logistics repository **328**.

For example, a customer lives in Tucson, Ariz. and plans a first trip from Tucson to New York City, N.Y., arriving in New York on October 25. The start location for the trip is Tucson, and the destination for the first trip is New York City. The storage facility **150** is a storage facility near Los Angeles, Calif. Before the trip (e.g., in January), the customer receives the suitcase **132** and packs the suitcase **132** with personal items (e.g., clothing and toiletries). The suitcase is then sent to the storage facility near Los Angeles (the storage facility **150**) for storage (e.g., in January). In March, the customer decides to go on the first trip from Tucson to New York City. The customer uses an app on a smart phone (an example of the customer device **120**) to make a request for delivery of the suitcase **132** to New York City by October 25. The customer provides a hotel and/or a hotel address in New York City. The customer interface **324** receives the request for delivery of the suitcase **132** to New York City. The customer interface **324** transfers the request for delivery of the suitcase **132** to New York City to the logistics engine **320**. The logistics engine **320** schedules with FedEx (an example of a package-delivery service **166**) pickup of the suitcase **132** from the storage facility on October 20 for delivery to the hotel by the morning of October 25. The logistics engine **320** provides instruction to the storage facility to prepare the suitcase **132** for pickup by FedEx on October 20, and, at that time, or optionally at a later time prior to pick up, communicates label information, such as a label format and parcel number, to the suitcase **132**, which displays properly formatted label information on the dynamic display **412**. The logistics engine stores information about FedEx picking up the suitcase **132**, the hotel information, and instructions to the storage facility in the logistics repository **328**.

On October 20, FedEx picks up the suitcase **132** at the storage facility and delivers the suitcase **132** to the hotel the morning of October 25. Because the dynamic display **412** displays the assigned FedEx parcel number in an appropriate FedEx-compatible format, FedEx personnel and systems can handle the suitcase **132** as a standard FedEx package, including scanning the dynamic display **412** in the same manner and with the same equipment that a FedEx label is scanned, updating FedEx's systems with information about a location and/or progress of the suitcase **132** as the suitcase **132** is shipped. A service interface communicates with FedEx systems application programming interfaces, receives updated information about the location and/or prog-

ress of the suitcase **132** as updates are available, and in turn updates the logistics system **108**, the logistics engine **320**, the customer interface **324**, and/or the logistics repository **328**.

On October 20, the logistics engine **320** notifies the customer interface **324** of FedEx picking up the suitcase **132** and stores the notification in the logistics repository **328**. The customer can access information about FedEx picking up the suitcase **132** through the customer interface **324**. In some embodiments, the customer interface **324** pushes an alert to the customer device **120** (e.g., as a text message or to show up in a notification center of the smart phone) that the suitcase **132** was picked up by FedEx on October 20. Similarly, the customer can receive a text that the suitcase **132** arrived at the hotel on October 25. On the morning of October 25, the customer boards an airplane at Tucson and flies to New York City. When the customer arrives at the hotel in New York City, a staff member at the hotel gives the customer the suitcase **132** when the customer checks-in at the hotel. In some embodiments, the hotel staff sends the suitcase **132** to the customer's room before the customer checks in (and the customer receives a text that the suitcase **132** is waiting in the customer's room).

On October 15, the customer plans a second trip. The second trip is to San Francisco on November 3. The customer, using the customer device **120**, provides information about the second trip to the customer interface **324**. When the customer is finished with the first trip to New York City, the customer sends the suitcase **132** back to the storage facility (or in some embodiments, the customer leaves the suitcase in the customer's room or at the front desk of the hotel in New York and the logistics engine **320** instructs the hotel staff to set the suitcase **132** for pick up by a package-delivery service **166** for delivery from New York to the storage facility). The logistics engine **320** schedules clothes in the suitcase to be washed and pressed, and for shoes in the suitcase **132** to be polished (and an alert sent to the customer when the suitcase **132** is ready). The logistics engine **320** further schedules with UPS to deliver the suitcase **132** from the storage facility to a hotel in San Francisco, so that the suitcase **132** is waiting for the customer when the customer arrives in San Francisco on November 3.

Referring to FIG. 3B, a block diagram of an embodiment of a system for storage and delivery of the suitcase in collaboration with service providers is shown. FIG. 3B is similar to FIG. 3A with the addition of a collaboration engine **340**, a preference repository **344**, and a plurality of service providers **124**. The collaboration engine **340** and the preference repository **344** are part of the logistics system **108**.

The collaboration engine **340** works with service providers **124** to provide the customer with assistance when traveling. Some examples of service providers **124** include social media providers, weather websites, travel advisory websites, hotels, and transportation providers (e.g., taxi, bus, and subways). For example, the collaboration engine **340** checks a weather report when the customer is to be in New York City and identifies a more than 50% likelihood of rain. The collaboration engine **340** identifies that an umbrella is not listed on an inventory list of the suitcase **132**. The collaboration engine **340** notifies the customer through the customer interface **324**, and the customer is given an option to have an umbrella placed in the suitcase **132** while the suitcase is at the storage facility. Or an umbrella is automatically placed in the suitcase **132**. Or the hotel staff at the New York Hotel are notified and the hotel staff offer the customer an umbrella.

In some embodiments, the collaboration engine **340** links information from the logistics system **108** to social media accounts. For example, the customer could be notified that certain contacts from a LinkedIn account may also be in New York City during the first trip. The customer may also be given dress recommendations for events the customer is attending in New York City. The inventory list could be shared with friends. Further, preferred accounts (e.g., frequent flyer accounts and preferred guest accounts for hotels) can be consolidated and preferred businesses used.

Referring next to FIG. **3C**, a block diagram of an embodiment of a system for storage and delivery of the suitcase having multiple interfaces for different users is shown. In FIG. **3C**, the logistics system **108**, the customer device **120**, and a plurality of service-provider devices **360** connect to the Internet **116**. The logistics system **108** comprises the logistics engine **320**, the logistics repository **328**, the customer interface **324**, a service interface **364**, a provider management module **366**, and a profile repository **368**. The service interface **364** communicates with the service-provider devices **360**. The logistics engine **320** is in communication with the suitcase **132** (e.g., through the modem **416**, described in reference to FIG. **6**). The service interface **364** allows the service-provider device **360** to interact with the suitcase **132**.

In some embodiments, information from service-provider devices **360** is accessed through the service interface **364**, which accesses available application programming interfaces at and/or through the service-provider devices **360**, and communicates the information from the service-provider devices to subsystems of the logistics system **108**, such as the logistics engine **320**, customer interface **324**, and/or logistics repository **328**. The service interface **364**, as appropriate, enables the logistics system **108**, and/or subsystems of the logistics system **108**, to monitor and report location information and/or progress information of the suitcase **132**; to modify elements of a route of the suitcase **132**, if requested and/or if necessary; to communicate to other service-provider devices **360**; and/or to manage service providers, as appropriate.

For example, the customer device **120** has one version of a mobile application (i.e., mobile app); a hotel staff member has a second version of the mobile application on an iPad; and a dry cleaner has a third version of the mobile application on an iPad. Profiles of the customer, the hotel staff member, and the dry cleaner are stored in the profile repository **368**. The customer, the hotel staff member, and the dry cleaner are each permitted different information and access to the suitcase **132** based on a version of the mobile application and/or a profile. For example, the customer is allowed to select locations to send the suitcase **132** and unlock the suitcase **132**. A bellhop is able to scan a 2-D barcode on the screen **470** and determine a room number to place the suitcase **132** in, without necessarily learning an identification of the customer. The bellhop is also able to provide status updates and schedule pick up of the suitcase **132** by a package-delivery service **166**. The dry cleaner is able to unlock the suitcase **132** and provide status updates. In some embodiments, requests for action or information are authenticated.

In some embodiments, the service interface **364** also interfaces with service-provider devices **360** to authenticate or otherwise authorize provider personnel. For example, provider personnel may use a smartphone interface to send and receive information to and from the logistics system **108**, and/or subsystems of the logistics system **108**, such as scanning a suitcase **132** or indicating a location change for

a suitcase **132**. The provider personnel smartphone interface software may be freely downloadable from a smartphone manufacturer app store or other app store; after downloading the provider personnel smartphone interface software, an employee of, or contractor working for, the service provider can enter credentials of the provider personnel, such as employee number, email address, and/or password into the provider personnel smartphone interface software. The smartphone interface software in turn can authenticate the provider personnel directly (e.g., on a system device of the provider) and/or via the service interface **364**. In some embodiments, authentication includes employing federated electronic identity technologies such as OAuth, OpenID, Liberty ID, single sign-on, SAML, and/or another federated electronic identity technology. If the service provider **124** does not have systems supporting federated electronic identity, the provider management module **366** can directly support provider personnel enrollment, verification, credential management (e.g., user ID, password, biometric data, and/or other credentials), and/or user authentication. The provider personnel smartphone interface software may provide support for scanning the dynamic display **412** using a built-in camera or may support identifying, or optionally communicating with, the suitcase **132** using one or more communication protocols, such as NFC, Bluetooth, Wi-Fi Direct, and/or other device-to-device direct communication protocol.

As has been discussed, there are different mobile apps for different functionality and/or users. For example, there is a customer app for the customer, a first service app for a first type of service provider (e.g., for hotel staff), a second service app for a second type of service provider (e.g., for dry cleaners), etc. Thus the customer app could track one or more pieces of luggage belonging to, or associated with, the customer, and the first service app could track multiple pieces of luggage under control of the service provider (e.g., all suitcases in the hotel). But the different apps are all communicating with a single, integrated cloud-based system (e.g., logistics system **108**). Furthermore, additional apps can be made for additional functions. For example, in some embodiments, an assistant app is used by an assistant to track one or more boss' suitcase(s). The assistant could work for a first boss and a second boss. The assistant app could link together luggage information for the first boss and the second boss. The assistant, based on permissions granted, could then perform tasks such as track luggage, schedule replacement contents, schedule delivery, etc.

In some embodiments, after the provider personnel smartphone interface software scans the dynamic display **412**, and/or otherwise identifies the suitcase **132**, the provider personnel smartphone communicates with the service interface **364**, which can optionally provide instructions and/or codes to be communicated to the suitcase **132** and/or communicate directly to the modem **416** of the suitcase **132**. For example, the dynamic display **412** can be instructed to display different or additional information. Continuing with the example of the Tucson to New York trip, when the suitcase **132** arrives at the hotel in New York, the hotel bellman, who has previously logged into the provider personnel smartphone interface software with the user name and password provided by his employer and been authenticated through the service interface **364** by the hotel's human resources system as an employee of the hotel, can scan the suitcase **132** using the provider personnel smartphone interface software utilizing a camera on the smartphone. The provider personnel smartphone interface software then communicates to the service interface **364**, which communicates

11

via the Internet **116** with the hotel's reservation management system to obtain the customer's assigned room number, and then communicates wirelessly, using the Internet **116** and/or cellular network, to the modem **416** of the suitcase **132** and instructs the dynamic display **412** to stop displaying the FedEx label and instead to display the customer's room number. Note that this system also provides enhanced security and privacy for the customer since the hotel bellman never learns personally-identifying information about the customer (e.g., the customer's name, gender, age, etc.).

Though many embodiments have discussed delivery by a parcel service (e.g., to and from a hotel or a residence), many other delivery destinations are possible. For example, the suitcase **132** could be delivered to a restaurant; a business office; a particular office room or conference room of the business office; a bank; a rental car business; a car of the rental car business that is to be rented by the customer; a trunk of the rental car; a train station; an airport; a lounge (e.g., a lounge at an airport); a golf course; a ski resort; and a gym. Many possible delivery destinations are possible and more efficient, in some embodiments, because of the dynamic display **412** and/or the logistics system **108**. For example, the customer leaves luggage containing golf clubs at a golf course, and the customer indicates (e.g., by an app on a smart phone or using the dynamic display **412**) that the luggage containing golf clubs is to return to a storage location. The indication is received by the logistics system **108**. The logistics system **108** transmits a notification to a parcel service to pick up the luggage containing golf clubs with an address of the golf course and updates the screen **470** to reflect a parcel label. In some embodiments, the address of the golf course is selected by the customer, determined by a location of the customer's smartphone at a time that the customer indicates that the luggage containing golf clubs is to return to storage, and/or a GPS receiver of the luggage containing golf clubs.

Further, more than one piece of luggage can be used for a trip, but have different handling/delivery details. For example, the customer could have a first piece of luggage, containing clothes, delivered to a hotel in a city; and a second piece of luggage, containing presentation/demo equipment, to be delivered to a trunk of a rental car in the city. When the customer arrives by air to the city, the customer rents the rental car. The customer then travels in the rental car to an office to give a presentation. After the presentation, the customer goes to the hotel in the city. In this example, the customer does not need to travel with the first piece of luggage to the office to give the presentation.

It is noted that embodiments in FIGS. **3A**, **3B**, and **3C** are not exclusive embodiments, but have been shown and described to provide an understanding of aspects of this invention to a person skilled in the art. Certainly, some embodiments contain all functions and/or features discussed in FIGS. **3A**, **3B**, and **3C**; and some embodiments have less than all functions and/or features discussed in FIGS. **3A**, **3B**, and **3C**, depending on design criteria and desired functionality. Similarly, a person skilled in the art will recognize that many elements disclosed in this application can be combined, omitted, and/or rearranged with other elements depending on design criteria and desired functionality.

Referring to FIGS. **4A** and **4B**, simplified diagrams of embodiments of a suitcase **132** for delivery from a storage facility are depicted. In FIG. **4A**, a block diagram of an embodiment of a suitcase **132** is shown. The suitcase **132** comprises a luggage engine **404**, luggage memory **408**, a dynamic display **412**, a modem **416**, a tamper lock **420**, and a register **424**. The luggage engine **404**, the luggage memory

12

408, the dynamic display **412**, the modem **416**, the tamper lock **420**, and the register **424** are connected to communicate via a communication bus **428**. The luggage engine **404** comprises one or more processors. The luggage memory **408** comprises one or more memory devices. The modem **416** is used to transmit data to and/or receive data from one or more computing devices (e.g., server, desktop computer, laptop, and/or mobile device) In optional aspects of the embodiment, the modem **416** may comprise one or more of: a cellular or non-cellular mobile device; a Wi-Fi or other fixed wireless device; a Bluetooth, near field communication, beacon, or other short-range device; a Global Positioning System device; an audible or inaudible sound-generating and/or sound-receiving device component; an optical device; and/or other component for the purpose of communicating to and/or from people and/or machines.

In FIG. **4B** a simplified sketch of an embodiment of the suitcase **132** is shown. The suitcase **132** is basically rectangular in shape and comprises wheels **450**, a zipper **454** with two zipper pulls **458**, and a handle **462** for pulling the suitcase **132**. In some embodiments, the suitcase **132** is sized as a carry on for air travel (e.g., less than 45 linear inches/114 linear cm; or less than 22×14×9 inches/56×35×23 cm). In some embodiments, the suitcase **132** is a fold-over suitcase for transporting a suit. Other forms of luggage will be apparent to a person of ordinary skill in the art. In this disclosure, a piece of luggage is considered a bag. A bag is a portable container for carrying items. Though this disclosure discusses suitcases, similar processes can be used for other types of bags. The suitcase **132** further comprises a console **466**. The console, in this embodiment, is shown having a screen **470**, a locking mechanism **474**, and an antenna **478**. In some embodiments, the screen **470** is an electronic screen. The console **466** further comprises a processor, which can function as the luggage engine **404**, and luggage memory **408**. The zipper pulls **458** are secured by the locking mechanism **474** in a position to secure the suitcase **132** in a closed position (e.g., zipper **454** secures a lid **486** to a bin portion **490** of the suitcase **132**). In some embodiments, the antenna **478** is internal to the console **466**. In some embodiments, the antenna **478** receives a signal to unlock the locking mechanism **474** and an actuator in the console **466** unlocks the locking mechanism **474**. The console **466** further comprises a mechanical-access lock **482**. In some embodiments, the screen **470** is used to display routing information, such as a parcel label for shipping through a parcel service, instructions for handling and/or processing, and/or instructions for the customer.

Referring next to FIGS. **5A**, **5B**, and **5C**, simplified diagrams of embodiments of the dynamic display **412** used with the suitcase **132** are shown. In FIG. **5A**, A block diagram of the dynamic display **412** is shown. The dynamic display **412** comprises a screen **470**, a display engine **508**, a power source **516**, and display memory **520**.

The screen **470** is dynamically updated to enable and/or indicate sequential and/or flexible routing and/or re-routing through a series of route stops, routing and/or re-routing to multiple destinations, routing and/or re-routing to a specific location within an overall location (for example, to a specific hotel room within a hotel at a street address), and/or to communicate other information, in human readable form and/or system readable format. In some embodiments, the screen **470** displays information that serves as a mailing label. For example, the screen **470** is configured to show an address, including street address, city, state, and zip code. In some embodiments, the screen **470** shows a symbol, such as a bar code (1-D or 2-D) or QR code, or displays OCR

readable characters or other machine readable information. The screen 470 can display information for a particular package-delivery service, freight transporter, transportation company, courier service, car service, hotel or other travel-related company, for a provider of services related to content of the suitcase, for security services such as the United States Transportation Services Authority, and/or for another party that may transport, monitor, move, open, or otherwise handle the suitcase and/or its content. Some examples of providers of package-delivery services include The United States Postal Service, FedEx, UPS, DHL, and Parcel Pool. Additionally, other common carriers and/or contract carriers provide package-delivery services. Further, the screen 470 can provide instructions for service providers that are not normally in business for package delivery. For example, the screen 470 could provide instructions to a bellhop of a hotel to place the suitcase 132 in the mailroom for a FedEx 10:30 am pickup.

Though many different forms of electronic displays can be used for the screen 470 (e.g., liquid crystal display or light emitting diodes), in some embodiments an electronic-paper display is used to conserve power.

The display engine 508 determines what is displayed on the screen 470. In some embodiments, what is displayed on the screen 470 changes multiple times from a point of origin to a final destination. For example, the display engine 508 causes the screen 470 to display instructions for a bellhop in a hotel to give the suitcase 132 to a courier service. After the courier service picks up the suitcase 132, the display engine 508 causes the screen 470 to display an address of a UPS store nearby. Once the suitcase 132 is at the UPS store, the display engine 508 causes the screen 470 to display a UPS label, which includes a two-dimensional barcode that is read by a UPS barcode reader, to send the suitcase 132 to an address in another city.

In some embodiments, the dynamic display 412 is configured to recover, or re-display, a previously displayed screen and/or label. For example, the suitcase 132 first displays a shipping label for FedEx. FedEx drops off the suitcase 132 at a hotel, and the dynamic display 412 changes to display a room number. But an employee at the hotel realizes the suitcase 132 has been delivered to the wrong hotel. The dynamic display 412 is updated to re-display the shipping label for FedEx, so the suitcase 132 can be picked up and properly delivered using an original parcel number. For example, when the dynamic display 412 changes, the dynamic display 412 could have a button appear on the screen 470 indicating a mistaken delivery, such as "Wrong delivery?". The employee of the hotel presses the button "Wrong delivery?" and the shipping label for FedEx is redisplayed. In some embodiments, an indication of a mistaken delivery is transmitted to a service provider, such as FedEx. For example, the suitcase 132, via the modem 416, sends a message to a logistics system that the suitcase 132 was delivered incorrectly.

In some embodiments, instructions are further provided on the screen 470 if there has been a mistaken delivery, such as "Please place this package outside the door it was left at. A FedEx representative has been notified and will stop by to pick up this package."; or "Please place this package in a safe place and a courier will contact you to retrieve this package. If in doubt of the authenticity of the courier, please ask the courier for a pin number associated with this package. The pin number for this package is: 4798." In some embodiments, the employee at the hotel indicates a mistaken delivery by a mobile app on a smartphone of the employee at the hotel using a scan of the suitcase 132 (e.g., taking a

picture of the screen 470) and/or by entering a unique number of the suitcase 132 that is displayed on the screen 470 and/or physically marked on the suitcase 132. The employee at the hotel can also receive instructions by the mobile app for actions to take regarding the mistaken delivery.

In some embodiments, a confirmation screen on the screen 470 is used. For example, When FedEx delivers the suitcase 132 to the hotel, an employee would have to sign for the suitcase (e.g., using the screen 470) or touch an icon on the screen 470 indicating acceptance and/or correct delivery. In some embodiments, the dynamic display comprises a camera, and when the screen 470 is touched (e.g., touching the icon), and/or signed, the camera activates to acquire one or more pictures and/or a video segment. In some embodiments, the one or more pictures and/or video segment are used to help verify who accepted the suitcase 132.

In some embodiments, a copy of what is displayed on the screen 470 is transmitted for display on a second device. For example, the customer has a smartphone and a customer app on the smart phone has a feature to display on the smart-phone what is displayed on the screen 470. In some embodiments, the customer app is configured to display similar information to what is displayed on the screen 470. For example, the screen 470 actually displays a 2-D barcode; and the customer app displays a small image of the 2-D barcode and a textual translation and/or summary of information contained in the 2-D barcode. In some embodiments, the customer app is configured to present information on the screen 470 in a common format to the customer even though the screen 470 may actually display delivery instructions in multiple different formats. Examples of information presented by the customer app include: parcel number, delivery address, an image of the screen 470, a history of changes to the screen 470, and future, expected changes to the screen 470. For future, expected changes a whole label, partial label, and/or delivery information could be shown. For example, if a carrier is already selected, then a whole label could be shown (e.g., including a carrier's parcel number); but if a carrier is not selected yet, then just a next destination address and/or location is displayed.

In some embodiments, the screen 470 is also a touch screen and the luggage engine 404 receives information through the touch screen. For example, once a courier receives the suitcase 132, the courier enters a code in the touch screen. The screen 470 then displays the address of the UPS store nearby and the bellhop is satisfied that the courier is authentic and taking the correct piece of luggage. In optional aspects of some embodiments, the display engine 508 and/or the luggage engine 404 determine the information, or the format of the information, to be displayed, or that no information is to be displayed, on the screen 470 based on instructions or information received via the modem 416 or based on location, time and/or date, interaction with another device or with a software application on another device, identity of another entity such as a transportation or other service provider, an event, an event within a sequence of events, and/or receipt of manual input at the suitcase.

The display engine 508 is linked to the modem 416. The display engine 508 receives and/or sends instructions and/or data to the modem 416. In some embodiments, the display engine 508 changes what is displayed on the screen 470 based on received instructions and/or data from the modem 416. In some embodiments, the display engine 508 transmits data about the suitcase 132 (e.g., location, delivery confirmation, etc.) to the modem 416. The modem 416 is explained in more detail in the discussion of FIG. 6 below.

The power source **516** of the dynamic display **412** can be separate or combined with a power system of the suitcase **132**. In some embodiments, the power source **516** is a battery. In some embodiments, the power source **516** is AC power (e.g., 420V, 240V, and/or 250V) and/or DC power (e.g., power from a USB cable and/or a battery or batteries). In some embodiments, data is transferred through the USB cable to and from the suitcase **132**. In some embodiments, power source **516** is a battery that can be recharged wirelessly, for example when the battery is within range or a wireless recharging component.

The dynamic display **412** further comprises display memory **520**. In some embodiments, the display memory **520** is part of the luggage memory **408**. In some embodiments, the display memory **520** is separate from the luggage memory **408**.

In FIG. 5B, a simplified sketch of an embodiment of the console **466** is shown. The console **466** comprises the screen **470** (as part of the dynamic display **412**), the locking mechanism **474**, the mechanical-access lock **482**, and the antenna **478**. Also shown as part of the console **466** is a port **524** (e.g., used to make an electrical connection with another device using structures such as USB, Firewire (IEEE 1394), eSATA, Ethernet, HDMI, Display Port, Lightning, RCA, S-Video, phone connector (e.g., TS, TRS, TRRS), and/or other wired connection), and a battery door **528**. In some embodiments, the port **524** is used to power the console **466**. In some embodiments, the port **524** is used power another device. In some embodiments, the port **524** is used to send and receive information to and from the processor and/or memory device of the console **466**. In some embodiments, the port **524** is used to charge another device (e.g., a mobile phone). The battery door **528** is used to access a battery compartment. The battery compartment holds one or more batteries as a power source for the console **466** (e.g., AAA, AA, C, D, button cell, lithium, etc.). In some embodiments, the console **466** further comprises a solar panel to completely or partially power the console **466**. The console **466** is shown further comprising the locking mechanism **474** and the mechanical-access lock **482**. The zipper pulls **458** are secured using the locking mechanism **474**. The locking mechanism **474** can be unlocked by receiving an electronic signal (e.g., via the antenna **478** and/or the port **524**). In some embodiments, the mechanical-access lock **482** is used in addition to an electronic locking device to unlock the locking mechanism **474**. For example, the mechanical-access lock **482** is a tumbler-style lock that is TSA (Transportation Security Administration) compliant so that the suitcase **132** can be opened by TSA. In another example, the mechanical-access lock **482** is used if the console **466** loses power and/or if other problems arise using an electronic signal to unlock the suitcase **132**. In some embodiments, the mechanical-access lock **482** is a tubular lock, a combination lock, magnetic-keyed lock, and/or other type of lock. In some embodiments, the console **466** is built into a suitcase **132** during manufacturing. In some embodiments, the console is inside the suitcase **132** and the console does not comprise the tamper lock **420**.

FIG. 5C shows a simplified side view of an embodiment of the console **466**. The console has a front comprising the screen **470** and a back **560** opposite the front. Bolts **564** protrude from the back **560** of the console **466**. Nuts **568** screw on the bolts to secure material between the nuts **568** and the back **560** of the console **466**. The bolts **564** and nuts **568** are used to secure the console **466** to a pre-made piece luggage or other bag (e.g., the pre-made piece of luggage is

manufactured by an entity different from an entity that manufactured the console **466** and/or that operates the logistics system **108**).

Referring next to FIG. 6, a block diagram of an embodiment of the modem **416** is shown. The modem **416** allows the suitcase **132** to communicate with the customer, a service provider (e.g., hotel staff and/or dry cleaning staff), and/or other devices (e.g., a station or server for the modem **416** to beacon back location/status of the suitcase **132** and/or a customer device), or communicate wirelessly with other authorized or authenticated systems. The modem **416** comprises a communication engine **604** in communication with various communication elements. In this embodiment, the communication engine **604** is connected to a USB (Universal Serial Bus) port **524**, a near field chip **616**, a Bluetooth chip **620**, and a wireless transceiver **624**. It will be appreciated that the various communication elements need not all be present in other embodiments. For example, in some embodiments of the modem **416**, the modem **416** does not have the near field chip **616**. In some embodiments, the modem **416** has only the communication engine **604** and the wireless transceiver **624**. The modem **416** has one or more of the various communication elements depending on cost and desired functionality.

In some embodiments, the modem **416** comprises a GPS receiver **626** that receives signals from one or more GPS satellites **627**. The GPS receiver provides to the logistics system **108** updates regarding a location of the suitcase **132**.

The communication engine **604** is also connected, by the communication bus **428**, to the luggage engine **404**, the luggage memory **408**, the dynamic display **412**, the tamper lock **420**, and the register **424**.

The port **524** provides a wired port to the modem **416**. Though the embodiment in FIG. 6 has a port **524**, other wired ports could be used to establish a wired connection between the suitcase **132** and another device.

The near field chip **616** and the Bluetooth chip **620** provide relatively close-range communication between the suitcase **132** and second device. In some embodiments, close-range communication is less than 10, 5, or 2 feet separation between the suitcase **132** and the second device.

The wireless transceiver **624** enables the communication engine **604** to connect with a cell tower. Thus the modem **416** can send and/or receive data (e.g., text messages) using mobile phone technology. Further, in some embodiments, the wireless transceiver **624** is configured to connect to a local area network (LAN) **632** and/or a wide area network. In some embodiments, two wireless transceivers **624** are used, one to connect to the cell tower **140** (e.g., 700, 800, 850, and/or 4900 MHz) and one to connect to the LAN **632** (e.g., 900, 2400, and/or 5000 MHz). In some embodiments, the cell tower **140** and/or the LAN **632** provide a connection to the Internet **116**.

In some embodiments, the modem **416** also comprises an RFID chip. The RFID chip is used to identify the suitcase **132** to another device.

Referring next to FIG. 7A, a block diagram of an embodiment of the tamper lock **420** of the suitcase **132** is shown. The tamper lock **420** comprises a security engine **704**, an actuator **708**, a locking device **712**, a security repository **716**, a biometrics reader **720**, and a manual override **724**. The locking device **712** locks the suitcase **132**. For example, the locking device **712** comprises the locking mechanism **474**, wherein zipper pulls **458** of the suitcase **132** are secured by the locking mechanism **474**. In some embodiments, the locking device **712** is integrated into a housing (e.g., console **466**) that also comprises the screen **470**. In some embodi-

ments, some or all of the security engine 704, the security repository 716, a subset of the security engine 704, a subset of the security repository 716, or the biometrics reader 720 are physically separate from the suitcase and/or from the other components. For example, the security repository 716 and an authenticating subset of the security engine 704 may operate from a secured network location, interacting with an application software module executing on a smartphone that utilizes a smartphone's fingerprint reader component as the biometrics reader 720; in this example embodiment, the smartphone application software module reads a fingerprint read from the smartphone fingerprint reader to obtain biometric data, transmits the biometric data to the authenticating subset of the security engine 704, which in turn authenticates the biometric data against the security repository 716, and upon successful authentication of the biometric data issues an unlock code or command to the security engine 704 in the suitcase, or to the luggage engine 404 in the suitcase, or to the locking device 712 in the suitcase.

The security engine 704 is in communication with the modem 416 and the biometrics reader 720. The actuator 708 unlocks the locking device 712. The security engine 704 receives a request to unlock the locking device 712 from the modem 416 and/or the biometrics reader 720. The security engine 704 queries the security repository 716 to authenticate the request to unlock the locking device 712. After the security engine 704 authenticates the request to unlock the locking device 712, the security engine 704 transmits a signal to the actuator 708 to unlock the locking device 712. In some embodiments, the actuator 708 uses an electromagnet.

As an example, a customer wishing to unlock the suitcase 132 uses an interface on a mobile device to request the suitcase 132 to be unlocked. The request for the suitcase 132 to be unlocked is transmitted from the mobile device to the modem 416 of the suitcase 132. The request for the suitcase 132 to be unlocked could be transmitted to the modem 416 via the Internet 116, the LAN 632, the cell tower 140, the Bluetooth chip 620, and/or the port 524. The modem 416 transmits the request for the suitcase 132 to be unlocked to the security engine 704. The security engine 704 authenticates the request to the suitcase 132 to be unlocked by retrieving a data file from the security repository 716. After authentication, security engine 704 transmits a signal to the actuator 708. The actuator 708 then unlocks the locking device 712 and the customer can open the suitcase 132. In some embodiments, an open-and-lock log is kept and/or transmitted to the customer.

In some embodiments, the customer sends a text message with a code to the modem 416 and/or a central server and the locking device 712 is unlocked. In some embodiments, a user (e.g., customer and/or service provider(s)) wishing to unlock the suitcase 132 use a fingerprint reader on a mobile device for authentication. In some embodiments, the suitcase 132 has multiple compartments with different locking devices 712. For example, one compartment of the suitcase 132 is used for clothing and a second compartment of the suitcase 132 is used to store valuables (e.g., watches and jewelry). The first compartment has a locking device 712 that can be unlocked by a dry cleaner, so the dry cleaner can remove and wash the clothes. But the second compartment has a locking device 712 that can be opened by only the customer (with maybe one exception being help-desk support). In some embodiments, the second compartment can be opened only manually.

In some embodiments, authentication is performed remotely from the suitcase 132. For example, the customer

requests the suitcase 132 to be unlocked using a mobile device. The request for the suitcase 132 to be unlocked is transmitted to a central server. The central server authenticates the request for the suitcase 132 to be unlocked. The central server then sends a command to the modem 416 of the suitcase 132 for the security engine 704 to unlock the locking device 712. The request for the suitcase 132 to be unlocked is transmitted to the central server or to the modem 416 of the suitcase. The customer is then provided a temporary pin (e.g., via text message or through a user interface). The customer enters the temporary pin (e.g., a touch screen part of the screen 470) and the locking device 712 is unlocked. In some embodiments, a text message with a temporary pin is generated and sent to the customer automatically after the customer requests the suitcase 132 be sent to a destination.

In some embodiments, the tamper lock 420 has a manual override 724 so that a customer can unlock the suitcase 132. For example, the manual override 724 is a combination lock having buttons, scrolls, and/or wheels with characters and/or numbers. In some embodiments, the manual override 724 is a tangible key.

Referring next to FIG. 7B, a block diagram of another embodiment of the tamper lock 420 of the suitcase 132 is shown. In FIG. 7B, the tamper lock 420 comprises the actuator 708 and the locking device 712. The actuator 708 is electronically connected with the modem 416. The security engine 704 and the security repository 716 are located away from the suitcase 132. The modem 416 communicates with the security engine 704 and/or the security repository 716 via the Internet 116. A customer device 120 is also connected to the Internet 116. In this embodiment, the customer device 120 transmits a request, including credentials, to the security engine 704 for the suitcase 132 to be unlocked. The security engine 704 is located on a server connected to the Internet 116. The security engine 704 compares the credentials with a key in the security repository 716 (e.g., the security repository 716 stored on a hard drive (or other storage device) of the server or on a hard drive (or other storage device) of a different server). The security engine 704 authenticates the request from the customer device 120 and transmits a signal to the modem 416 for the suitcase to be unlocked. The modem 416 transmits the signal to the actuator 708, and the actuator 708 unlocks the locking device 712. In some embodiments, having the security engine 704 and the security repository 716 separate from the suitcase 132 enables a system to take advantage of computing and storing information in the cloud.

Referring next to FIG. 8, a block diagram of an embodiment of the register 424 of the suitcase 132 is shown. The register 424 comprises an inventory engine 804, an RFID reader 808, a plurality of RFID tags 812, and an inventory repository 816. The RFID reader 808 is attached to the suitcase 132 and is in communication with the modem 416. The RFID tags 812 are attached to items to be put in the suitcase 132. In some embodiments, the RFID tags 812 are placed on or in personal items. For example, RFID tags are sewn into shirt and/or pant hems. In some embodiments, optically readable or scan-able tags, such as barcode tags, OCR tags, and other printed or preprinted tags, are used instead of, or in addition to, RFID tags. In some embodiments, some or all of the inventory engine 804, RFID reader 808, and inventory repository 816 are physically separate from the suitcase and/or from the other components.

The inventory engine 804 causes the RFID reader 808 to sense which RFID tags 812 are within range of the RFID reader 808. The RFID reader 808 receives an indication

which RFID tags **812** are within range. In some embodiments, the RFID tags that are within range are recorded and time stamped and a file stored in the inventory repository **816**.

The inventory repository **816** stores a manifest **817** and/or an inventory list (e.g., records **818** of items in the suitcase) for the suitcase **132**. In some embodiments, the inventory repository **816** stores an inventory list of items belonging to the customer, but not currently in the particular suitcase **132**, either in another suitcase associated with the customer or not currently in any suitcase associated with the customer; stores information about, or attributes related to, the customer, or about a group including the customer (such as the customer's household members), or about one or more groups that may be related to the customer, such as sizes, styles, brand preferences, and the like; stores inventory history of the suitcase **132**; and/or stores item utilization history associated with the suitcase **132**, the customer, or both. The inventory list comprises items that were in the suitcase **132** when the inventory list was created. The inventory engine **804** compares the inventory list to the items corresponding to the RFID tags **812** that are within range of the RFID reader **808**. The inventory engine **804** creates a reconciliation report **819**, wherein the reconciliation report **819** identifies items that are on the inventory list and are within range of the RFID reader **808**. The reconciliation report **819** also identifies items that are on the inventory list but do not have a corresponding RFID tag **812** that is within range of the RFID reader **808**.

In some embodiments, if an RFID tag **812** is out of range of the RFID reader **808** for more than a given time period (e.g., 10, 20, 30, or 60+ minutes) then the personal item associate with the RFID tag **812** is flagged. In some embodiments, flagged personal items are washed after the suitcase **132** is returned from a destination. In some embodiments, personal items are individually wrapped in plastic if they are clean. If a personal item is removed from the plastic wrap then the personal item is flagged for cleaning after the customer returns the suitcase **132**. In some embodiments, a moisture sensor and/or temperature sensor are used to determine if a personal item is flagged for cleaning. In some embodiments, different compartments in the suitcase **132** are used to determine if a personal item is flagged for cleaning (e.g., clothing items to be cleaned are placed in a first compartment, and clothing items not needing cleaned are placed in a second compartment). In some embodiments the suitcase **132** can be tagged not to be opened. In such embodiments, the suitcase **132** is not opened even though some items may be flagged for processing. In some embodiments, the customer can turn on and/or off the tag for the suitcase **132** to not be opened. For example, after a first trip the customer turns on the tag for the suitcase **132** not to be opened, but after a second trip the customer turns off the tag for the suitcase **132** not to be opened. A customer may choose to turn off the tag for the suitcase **132** not to be opened based on a schedule and/or event (e.g., after every third trip or before a trip if there has been nonuse of the suitcase **132** for over three months).

In some embodiments, the RFID tags **812** comprise information such as an account number of a customer and/or an item tag of a specific item. In some embodiments, the RFID tags **812** comprise instructions. For example, a first RFID tag **812-1** is sewn into a shirt and contains instructions to launder and press using heavy starch. After the suitcase **132** is returned by the customer, a dry cleaner uses an RFID reader and receives instructions for cleaning and starching the shirt.

Referring next to FIG. **9A**, a block diagram of an embodiment of an inventory display system for the suitcase **132** is shown. FIG. **9A** is similar to FIG. **8** with the addition that the modem **416** is in contact with a customer device **120** (e.g., similar to customer device **120** in FIG. **7B**). Examples of a customer devices **120** include personal computers, mobile phones, tablets, and computerized eyewear (e.g., Google Glass). The modem **416** can be in contact with the customer device **120** using one or more of the various communication elements as describe in FIG. **6**.

The inventory engine **804** transmits the reconciliation report **819** and/or records **818** through the modem **416** and to the customer device **120**. Thus, in some embodiments, the customer can know the contents of the suitcase **132** in real time or near real time (based on the refresh rate of the RFID reader **808** and communication speed of the customer device **120** with the modem **416**). In some embodiments, the reconciliation report **819** is transmitted to a service provider.

Referring next to FIG. **9B**, a block diagram of another embodiment of the inventory display system for the suitcase **132** is shown. In FIG. **9B**, the register **424** comprises the RFID tags **812** and the RFID reader **808**. The RFID reader **808** is electronically connected with the modem **416**. The inventory engine **804** and the inventory repository **816** are located away from the suitcase **132**. The modem **416** communicates with the inventory engine **804** and/or the inventory repository **816** via the Internet **116**. The inventory engine **804** is located on a server connected to the Internet **116**. The inventory repository **816** is stored on a hard drive (or other storage device) of the server or a different server. The customer device **120** is also connected to the Internet **116**. In this embodiment, information about RFID tags **812** is transmitted from the RFID reader **808** to the modem **416** and to the inventory engine **804** and/or the inventory repository **816** via the internet **116**. The inventory engine **804** transmits the reconciliation report **819** and/or other information to the customer device **120** via the Internet **116**. The inventory engine **804** also receives requests for information from the customer device **120** via the Internet **116**. In some embodiments, having the inventory engine **804** and the inventory repository **816** separate from the suitcase **132** enables a system to take advantage of computing and storing information in the "Cloud."

It will be appreciate by those skilled in the art that elements and/or functionality of the suitcase **132** in FIGS. **4** through **9** can be combined, omitted, and/or rearranged based on design criteria and desired functionality. It will be appreciated by those skilled in the art that further elements of the suitcase **132** can be performed and/or moved into the "Cloud" (such as the luggage engine **404** and/or luggage memory **408**). For example, in some embodiments, the suitcase **132** comprises the dynamic display **412**, the wireless transceiver **624**, the actuator **708**, and the locking device **712**; the luggage engine **404**, the luggage memory **408**, the display engine **508**, the communication engine **604**, and the security engine **704** are consolidated to a server connected to the Internet **116**; and the register **424**, the near field chip **616**, the port **524**, and the Bluetooth chip **620** are omitted. In some embodiments, the tamper lock **420** is also omitted.

In some embodiments, the reconciliation report comprises a graphic for each item on the inventory list. For an item on the inventory list that is not within range of the RFID reader, the graphic is muted (e.g., grayed out). In some embodiments, the customer can select an item on the reconciliation report and provide instruction for processing the item on the reconciliation report. For example, the customer can request the item on the reconciliation report **819** be mended. In

another example, the customer requests the item on the reconciliation report **819** be removed from the manifest **817** of the suitcase **132** and/or requests the item be replaced with another specific item (e.g., a particular shirt), or generally with another item (e.g., another business shirt having buttons and a collar).

In FIG. **10**, a simplified diagram of a customer interface for managing shipping of one or more suitcases **132** is shown. In some embodiments, a customer has more than one suitcase **132**. The customer interface **324** enables the customer to track and manage suitcases **132**. In some embodiments, a customer has more than one suitcase **132** and stores suitcases **132** based on travel history and/or preferences of the customer. For example, the customer could have a first suitcase **132-1** staged (e.g., stored) on the west coast of the United States and a second suitcase **132-2** staged on the east coast of the United States.

FIG. **11** illustrates a flowchart of an embodiment of a process **1100** for routing a suitcase **132** for delivery. The process **1100** for routing a suitcase begins in step **1104** where a suitcase **132** is received from a customer. In some embodiments, the customer takes pictures of items placed in the suitcase **132** and uploads the pictures through the customer interface **324**. In some embodiments, an inventory of the suitcase **132** is made after the suitcase **132** is received from the customer. In some embodiments, if the inventory of the suitcase **132** is made after the suitcase **132** is received from the customer, the customer is allowed to modify names and/or pictures of inventory items.

In step **1108**, the suitcase is stored at a first location. In some embodiments, the first location is the storage facility **150**. A first request for the suitcase **132** is received, wherein the first request specifies that the suitcase **132** is to be sent to a second location, step **1112**. The suitcase **132** is routed to the second location, step **1116**. In step **4120**, a second request is received, wherein the second request specifies that the suitcase is to be sent to a third location. In step **4124**, the suitcase **132** is routed to the third location.

In some embodiments, the logistics system **108** provides the customer with information about two suitcases, a first suitcase **132-1** and a second suitcase **132-2**; and receives instructions from the customer that include a desired location to send the first suitcase **132-1** to a first desired location and to send the second suitcase **132-2** to a second desired location. In some embodiments, the first desired location is different from the second desired location (e.g., different cities). In some embodiments, the suitcase **132** is stored at a fourth location after being routed to the second location and before being routed to the third location. In some embodiments, the suitcase is stored at the fourth location based on a travel history of the customer; customer preference; and/or future travel plans. In some embodiments, items in the suitcase **132** are processed (e.g., cleaned, polished) before the suitcase **132** is routed to the third location. In some embodiments, the screen **470** is used in routing the suitcase **132** (e.g., displays a FedEx label). In some embodiments, paper labels are used in routing the suitcase **132**.

In some embodiments, the logistics system **108** provides the customer flight information, emergency notifications regarding events near the second location and/or the third location, and/or tips regarding travel and using the suitcases **132**. For example, tips could include suggested items to pack and/or remove from the suitcase; suggested items to bring that are not included in the suitcase **132**; and/or a suggestion to get another suitcase **132** based on travel history.

Referring next to FIG. **12** a flowchart of an embodiment of a process **4200** for routing a suitcase **132** for delivery

using multiple interfaces is shown. The process **4200** for routing a suitcase using multiple interfaces begins in step **4204** by providing access to a first interface (e.g., customer interface **324**) to the customer. In step **4208**, a service provider is given access to a second interface (e.g., service interface **364**). In step **1212**, an instruction is received through the first interface to send the suitcase **132** from a first location (e.g., storage facility **150**) to a second location (e.g., destination). In step **1216**, a request for information is received through the second interface. In step **1220** the suitcase **132** is routed to the second location. And in step **1224**, the request for information is fulfilled.

In some embodiments, a second instruction is received, the second instruction being received from the service provider through the second interface; wherein the service provider is a dry cleaning business and the second instruction is to open the suitcase. In some embodiments, requests are authenticated. In some embodiments, the service provider is a hotel and the request for information is a room number of the customer. In some embodiments, the service provider is a cleaner and the request for information is for a list of items and/or processing instruction for items in the suitcase **132**.

FIG. **13** illustrates a flowchart of an embodiment of a process **1300** for providing a second suitcase to a customer when a first suitcase is unavailable. The process **1300** begins in step **1304** where a request is received from the customer to send a first suitcase from a first location to a second location. In step **1308** preferences of the customer are acquired. In some embodiments, preferences include clothing sizes, clothing styles, and/or toiletry preferences (e.g., brand of toothpaste). In step **1312** a determination is made to send the customer a second suitcase instead of the first suitcase. In some embodiments, the second suitcase is an emergency suitcase. In step **1316** a request is sent to a service provider to provide the customer the second suitcase.

In some embodiments, the process **1300** for providing the second suitcase is used when a customer is flying from one city and an airplane that the customer is flying is gets diverted. For example, a customer is flying to New York City but the airplane is diverted to Washington, D.C. because of a snowstorm in New York City. A service provider in Washington, D.C. is contacted and compiles a change of clothes and some toiletries for the emergency suitcase. In some embodiments, toiletry samples are provided by vendors (e.g., free samples). In some embodiments, the service provider is a retail store (e.g., department store and/or drug store). In some embodiments, the customer requests the emergency suitcase. In some embodiments, an emergency suitcase is prepared based on flight information of the customer without input from the customer.

In some embodiments, the emergency suitcase is provided if the suitcase of the customer can't be delivered because of a delay by the package-delivery service **166**. In some embodiments, the emergency suitcase is provided if the suitcase of the customer can't be rerouted in time because of a schedule change of the customer. In some embodiments, if the customer changes a schedule, or requests a suitcase be delivered within a short time period (e.g., within 24, 48, or 72 hours), the customer is given price options for delivering the suitcase and the emergency suitcase. The customer can then select from the price options what the customer prefers to receive. In some embodiments, in lieu of or in addition to the emergency suitcase, the suitcase is rerouted for the customer. For example, the suitcase could be rerouted from New York City to Washington, D.C. (either by request from the customer or based on a stored preference of the cus-

tomers). In some embodiments, delivery time of one or more suitcases is calculated and presented to the customer. For example, the customer may be willing to wait twelve hours for the suitcase in New York to be delivered to Washington, D.C. if given the option.

Referring next to FIG. 14 a flowchart of an embodiment of a process 1400 for unlocking a suitcase 132 using a mobile device is shown. Process 1400 begins in step 1404 by providing to a customer a suitcase having a wireless receiver (e.g., suitcase 132 with wireless transceiver 624). In step 1408 the suitcase 132 is routed from a first location (e.g., storage facility 150) to a second location (e.g., a destination selected by the customer). In step 1412, a request is received from a mobile device of the customer to unlock the suitcase 132. In step 1416, the request to unlock the suitcase 132 is authenticated. In step 1420, a command is transmitted to the wireless receiver to unlock the suitcase.

Referring to FIG. 15 a flowchart of an embodiment of a process 4500 for tracking items in a suitcase is shown. Process 4500 for tracking items in a suitcase begins in step 4504 where a plurality of RFID tags are queried (e.g., sensed by RFID reader 808 attached to suitcase 132). In step 4508, a plurality of items are identified based on querying the plurality of RFID tags. In step 1512 a repository is queried for an inventory of the suitcase 132. In some embodiments, the repository is in a memory device on the suitcase 132. In step 1516 an inventory report (e.g., a reconciliation report as described with FIG. 8) is generated.

A number of variations and modifications of the disclosed embodiments can also be used. For example, other luggage and/or containers besides a suitcase could be used. For example, portable containers configured to be shipped can be used. In some embodiments, portable containers configured to transport business equipment for presentations, such as presentation materials (e.g., posters, projection screens, and/or projectors), are used. In some embodiments, luggage for sporting equipment are used (e.g., containers for skis, golf clubs, hunting rifle/gear, and/or SCUBA gear). For example, a unit comprising functionality of the dynamic display 412 and modem 416 is fastened to a hardened case (e.g., Pelican rifle case 472-PWC-M14-1) by the customer. The customer places a rifle in the hardened case and uses a smartphone app to select a destination for the hardened case. Thus the customer does not need to declare a firearm when traveling by air or worry about traveling with the rifle through locations that may have restrictive firearm regulations. In some embodiments, a package-delivery service 166 is a type of service provider 124, and interacts with the logistics system 108 through the service interface 364 similarly as other service-provider devices 360 can.

Additionally, other features, such as an integrated weight sensor (e.g., built into a handle and/or wheel(s) of the suitcase) is used. In some embodiments, a generator integrated with a suitcase wheel or wheels is used to power electronics of the suitcase.

Further, features can be removed or added. For example, in some embodiments of the suitcase 132, the suitcase 132 does not use a dynamic display 412. Instead the suitcase 132 uses traditional mailing labels. In another variation, repositories (e.g., security repository 716 and/or inventory repository 816) are part of the logistics system 108 instead of the suitcase 132.

The above methods may be implemented by computer-program products that direct a computer system to perform the actions of the above-described methods and components. Each such computer-program product may comprise sets of instructions (codes) stored in a memory device. The instruc-

tions may be configured to run in sequential order, or in parallel (such as under different processing threads), or in a combination thereof.

Specific details are given in the above description to provide a thorough understanding of the embodiments. However, it is understood that the embodiments may be practiced without these specific details. For example, circuits may be shown in block diagrams in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

Implementation of the techniques, blocks, steps and means described above may be done in various ways. For example, these techniques, blocks, steps and means may be implemented in hardware, software, or a combination thereof. For a hardware implementation, the processing units may be implemented within one or more application specific integrated circuits (ASICs), digital signal processors (DSPs), digital signal processing devices (DSPDs), programmable logic devices (PLDs), field programmable gate arrays (FPGAs), processors, controllers, micro-controllers, microprocessors, other electronic units designed to perform the functions described above, and/or a combination thereof.

While the principles of the disclosure have been described above in connection with specific apparatuses and methods, it is to be clearly understood that this description is made only by way of example and not as limitation on the scope of the disclosure.

What is claimed is:

1. A logistics system for routing and tracking bags, the logistics system comprising:

a customer interface receiving, from a customer device running a first instance of an application, instructions to initiate a first set of operations, wherein:

a first function in the first set of operations is selecting a first set of items of a plurality of items, to populate a first bag, wherein the plurality of items are stored in a storage container at an origin location;

a second function in the first set of operations is selecting a first location to route the first bag from the origin location;

a third function in the first set of operations is selecting a processing option for each item in the first set of items of the plurality of items;

a fourth function in the first set of operations is selecting a second set of items from the plurality of items to populate a second bag, wherein the second set of items from the plurality of items includes one or more items from the first set of items of the plurality of items; and

a fifth function in the first set of operations is selecting a second location to route the second bag from the origin location; and

a logistic-system server receiving, from a first device running a second instance of the application, instructions to initiate a second set of operations, wherein:

a first function in the second set of operations includes sending a first trigger to a logistics engine to populate the first bag with the first set of items of the plurality of items;

a second function in the second set of operations includes routing the first bag to the first location;

a third function in the second set of operations includes a first tracking of the first bag to the first location;

a fourth function in the second set of operations includes transmitting the first tracking information to the logistics engine;

25

a fifth function in the second set of operations includes transmitting a first message to the logistics engine that the first bag is at the first location;

a sixth function in the second set of operations includes routing the first bag from the first location to the origin location;

a seventh function in the second set of operations includes a second tracking of the first bag to the origin location;

an eighth function in the second set of operations includes transmitting the second tracking information to the logistics engine;

a ninth function in the second set of operations includes transmitting a second message to the logistics engine that the first bag is at the origin location;

a tenth function in the second set of operations includes sending a second trigger to the logistics engine to begin the processing option for each item in the first set of items of the plurality of items to the logistics engine;

an eleventh function in the second set of operations includes sending a third trigger to the logistics engine to populate the second bag with the second set of items of the plurality of items; and

a twelfth function in the second set of operation includes routing the second bag to the second location; and the logistic engine receiving, from a second device, located at the origin location, running a third instance of the application, instructions to initiate a third set of operations, wherein:

a first function of the third set of operations includes receiving the first trigger to populate the first bag with the first set of items of the plurality of items;

a second function of the third set of operations includes initiating a first process to populate the first bag with the first set of items of the plurality of items;

a third function of the third set of operations includes receiving the first tracking information;

a fourth function of the third set of operations includes triggering a first notification to display the first tracking information on the customer device;

a fifth function of the third set of operations includes receiving the first message that the first bag is at the first location;

a sixth function of the third set of operations includes triggering a second notification to display that the first bag is at the first location, on the customer device;

a seventh function of the third set of operations includes receiving the second tracking information;

an eighth function of the third set of operations includes triggering a third notification to display the second tracking information on the customer device;

a ninth function of the third set of operations includes receiving the second message that the first bag is at the origin location;

a tenth function of the third set of operations includes receiving the second trigger to apply the process option to each item of the first set of items of the plurality of items;

an eleventh function of the third set of operations includes initiating a second process to return each item of the first set of items of the plurality of items to the storage container;

a twelfth function of the third set of operations includes initiating a third process to prepare the first bag for future use; and

a thirteenth function of the third set of operations includes receiving the third trigger to populate the second bag with the second set of items of the plurality of items.

26

2. The logistics system for routing and tracking bags as recited in claim 1, wherein the first bag and the second bag are the same bag or the first bag and the second bag are different bags.

3. The logistics system for routing and tracking bags as recited in claim 1, wherein the plurality of items are owned by a customer using the customer device.

4. The logistics system for routing and tracking bags as recited in claim 1, wherein the plurality of items are rented from the logistics system by a customer using the customer device.

5. The logistics system for routing and tracking bags as recited in claim 1, wherein the processing option includes, laundering, dry-cleaning, steaming, pressing, or polishing.

6. The logistics system for routing and tracking bags as recited in claim 1, wherein one or more of the plurality of items are purchased from the logistics system by a customer using the customer device.

7. The logistics system for routing and tracking bags as recited in claim 1, wherein the first location is a different location than the second location or the first location is the same as the second location.

8. A method for routing and tracking bags, the method comprising: receiving by a customer interface, from a customer device running a first instance of an application, instructions to initiate a first set of operations, wherein:

a first function in the first set of operations is selecting a first set of items of a plurality of items, to populate a first bag, wherein the plurality of items are stored in a storage container at an origin location;

a second function in the first set of operations is selecting a first location to route the first bag from the origin location;

a third function in the first set of operations is selecting a processing option for each item in the first set of items of the plurality of items;

a fourth function in the first set of operations is selecting a second set of items from the plurality of items to populate a second bag, wherein the second set of items from the plurality of items includes one or more items from the first set of items of the plurality of items; and

a fifth function in the first set of operations is selecting a second location to route the second bag from the origin location; and

receiving by a logistic-system server, from a first device running a second instance of the application, instructions to initiate a second set of operations, wherein:

a first function in the second set of operations includes sending a first trigger to a logistics engine to populate the first bag with the first set of items of the plurality of items;

a second function in the second set of operations includes routing the first bag to the first location;

a third function in the second set of operations includes a first tracking of the first bag to the first location;

a fourth function in the second set of operations includes transmitting the first tracking information to the logistics engine;

a fifth function in the second set of operations includes transmitting a first message to the logistics engine that the first bag is at the first location;

a sixth function in the second set of operations includes routing the first bag from the first location to the origin location;

a seventh function in the second set of operations includes a second tracking of the first bag to the origin location;

an eighth function in the second set of operations includes transmitting the second tracking information to the logistics engine;

a ninth function in the second set of operations includes transmitting a second message to the logistics engine that the first bag is at the origin location;

a tenth function in the second set of operations includes sending a second trigger to the logistics engine to begin the processing option for each item in the first set of items of the plurality of items to the logistics engine;

an eleventh function in the second set of operations includes sending a third trigger to the logistics engine to populate the second bag with the second set of items of the plurality of items; and

a twelfth function in the second set of operation includes routing the second bag to the second location; and receiving by the logistic engine, from a second device, located at the origin location, running a third instance of the application, instructions to initiate a third set of operations, wherein:

a first function of the third set of operations includes receiving the first trigger to populate the first bag with the first set of items of the plurality of items;

a second function of the third set of operations includes initiating a first process to populate the first bag with the first set of items of the plurality of items;

a third function of the third set of operations includes receiving the first tracking information;

a fourth function of the third set of operations includes triggering a first notification to display the first tracking information on the customer device;

a fifth function of the third set of operations includes receiving the first message that the first bag is at the first location;

a sixth function of the third set of operations includes triggering a second notification to display that the first bag is at the first location, on the customer device;

a seventh function of the third set of operations includes receiving the second tracking information;

an eighth function of the third set of operations includes triggering a third notification to display the second tracking information on the customer device;

a ninth function of the third set of operations includes receiving the second message that the first bag is at the origin location;

a tenth function of the third set of operations includes receiving the second trigger to apply the process option to each item of the first set of items of the plurality of items;

an eleventh function of the third set of operations includes initiating a second process to return each item of the first set of items of the plurality of items to the storage container;

a twelfth function of the third set of operations includes initiating a third process to prepare the first bag for future use; and

a thirteenth function of the third set of operations includes receiving the third trigger to populate the second bag with the second set of items of the plurality of items.

9. The method for routing and tracking bags as recited in claim **8**, wherein the first bag and the second bag are the same bag or the first bag and the second bag are different bags.

10. The method for routing and tracking bags as recited in claim **8**, wherein the plurality of items are owned by a customer using the customer device.

11. The method for routing and tracking bags as recited in claim **8**, wherein the plurality of items are rented from the logistics system by a customer using the customer device.

12. The method for routing and tracking bags as recited in claim **8**, wherein the processing option includes, laundering, dry-cleaning, steaming, pressing, or polishing.

13. The method for routing and tracking bags as recited in claim **8**, wherein one or more of the plurality of items are purchased from the logistics system by a customer using the customer device.

14. The method for routing and tracking bags as recited in claim **8**, wherein the first location is a different location than the second location or the first location is the same as the second location.

15. A non-transitory, computer-readable medium comprising instructions that, when executed by one or more processors, causes the one or more processors to perform operations for routing and tracking bags, the operations comprising:

receiving by a customer interface, from a customer device running a first instance of an application, instructions to initiate a first set of operations, wherein:

a first function in the first set of operations is selecting a first set of items of a plurality of items, to populate a first bag, wherein the plurality of items are stored in a storage container at an origin location;

a second function in the first set of operations is selecting a first location to route the first bag from the origin location;

a third function in the first set of operations is selecting a processing option for each item in the first set of items of the plurality of items; and

a fourth function in the first set of operations is selecting a second set of items from the plurality of items to populate a second bag, wherein the second set of items from the plurality of items includes one or more items from the first set of items of the plurality of items; and

a fifth function in the first set of operations is selecting a second location to route the second bag from the origin location;

receiving by a logistic-system server, from a first device running a second instance of the application, instructions to initiate a second set of operations, wherein:

a first function in the second set of operations includes sending a first trigger to a logistics engine to populate the first bag with the first set of items of the plurality of items;

a second function in the second set of operations includes routing the first bag to the first location;

a third function in the second set of operations includes a first tracking of the first bag to the first location;

a fourth function in the second set of operations includes transmitting the first tracking information to the logistics engine;

a fifth function in the second set of operations includes transmitting a first message to the logistics engine that the first bag is at the first location;

a sixth function in the second set of operations includes routing the first bag from the first location to the origin location;

a seventh function in the second set of operations includes a second tracking of the first bag to the origin location;

an eighth function in the second set of operations includes transmitting the second tracking information to the logistics engine;

a ninth function in the second set of operations includes transmitting a second message to the logistics engine that the first bag is at the origin location;

a tenth function in the second set of operations includes sending a second trigger to the logistics engine to begin the processing option for each item in the first set of items of the plurality of items to the logistics engine;

an eleventh function in the second set of operations includes sending a third trigger to the logistics engine to populate the second bag with the second set of items of the plurality of items; and

a twelfth function in the second set of operation includes routing the second bag to the second location; and receiving by the logistic engine, from a second device, located at the origin location, running a third instance of the application, instructions to initiate a third set of operations, wherein:

a first function of the third set of operations includes receiving the first trigger to populate the first bag with the first set of items of the plurality of items, a second function of the third set of operations includes initiating a first process to populate the first bag with the first set of items of the plurality of items;

a third function of the third set of operations includes receiving the first tracking information;

a fourth function of the third set of operations includes triggering a first notification to display the first tracking information on the customer device;

a fifth function of the third set of operations includes receiving the first message that the first bag is at the first location;

a sixth function of the third set of operations includes triggering a second notification to display that the first bag is at the first location, on the customer device;

a seventh function of the third set of operations includes receiving the second tracking information;

an eighth function of the third set of operations includes triggering a third notification to display the second tracking information on the customer device;

a ninth function of the third set of operations includes receiving the second message that the first bag is at the origin location;

a tenth function of the third set of operations includes receiving the second trigger to apply the process option to each item of the first set of items of the plurality of items;

an eleventh function of the third set of operations includes initiating a second process to return each item of the first set of items of the plurality of items to the storage container;

a twelfth function of the third set of operations includes initiating a third process to prepare the first bag for future use; and

a thirteenth function of the third set of operations includes receiving the third trigger to populate the second bag with the second set of items of the plurality of items.

16. The non-transitory, computer-readable medium comprising instructions that, when executed by one or more processors, causes the one or more processors to perform operations for routing and tracking bags as recited in claim **15**, wherein the first bag and the second bag are the same bag or the first bag and the second bag are different bags.

17. The non-transitory, computer-readable medium comprising instructions that, when executed by one or more processors, causes the one or more processors to perform operations for routing and tracking bags as recited in claim **15**, wherein the plurality of items are owned by a customer using the customer device.

18. The non-transitory, computer-readable medium comprising instructions that, when executed by one or more processors, causes the one or more processors to perform operations for routing and tracking bags as recited in claim **15**, wherein the plurality of items are rented from the logistics system by a customer using the customer device.

19. The non-transitory, computer-readable medium comprising instructions that, when executed by one or more processors, causes the one or more processors to perform operations for routing and tracking bags as recited in claim **15**, wherein the processing option includes, laundering, dry-cleaning, steaming, pressing, or polishing.

20. The non-transitory, computer-readable medium comprising instructions that, when executed by one or more processors, causes the one or more processors to perform operations for routing and tracking bags as recited in claim **15**, wherein one or more of the plurality of items are purchased from the logistics system by a customer using the customer device.

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